McGRAW-HILL DIGEST

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Gas Turbine Moves Ahead

Coal-burning type to be tested in locomotive. High-temperature marine unit has important innovations, including 85% efficient compressor

Important new progress in gas turbine development has been made in two separate research projects. Financed by the railroad and oil companies, the Locomotive Development Committee has achieved enough success with a coal-burning gas turbine—the ultimate in low-cost big power—that a 3,000-hp. locomotive driven by one will be built. More efficient than the diesel engine or the steam turbine, and 3 times as efficient as the present steam engine, the gas turbine locomotive will go 1,000 mi. without refueling compared to the present 200 to 400 mi. And there will be no stops for water, no smoke, no noisy exhaust, and no cinders. The turbine will use coal of talcum powder fineness, produced by finely grinding lump coal and then exploding the particles by sudden pressure release as they are shot from a nozzle, much as cereals are puffed.

Even if the coal-burning, gas-turbine locomotive should prove successful, that type of prime mover is not presently suitable for the bus, truck, or airplane because it is economical only in the larger sizes. —SCIENCE ILLUSTRATED

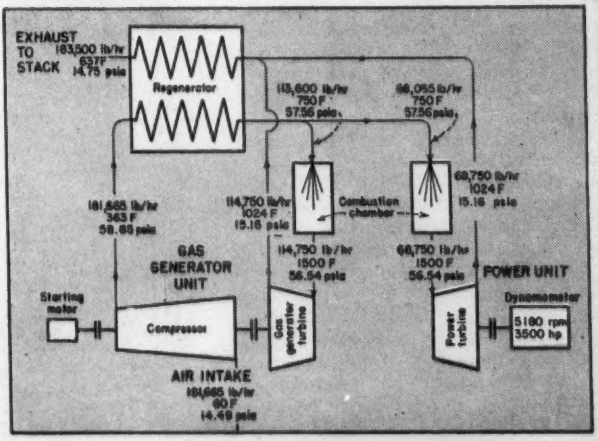
Following the announcement by Allis-Chalmers that its 3,500-hp. oil-fired gas turbine has been operated at 1350° F., more details about the 2-year old secret experiment at the U. S. Naval Engineering Experiment Station have been revealed. At 1500° F., for which the unit is designed and at which it will be operated, the overall plant thermal efficiency is estimated to be 40% in marine applications, compared to about 25% for an average steam turbine plant and something over 30% for diesel power.

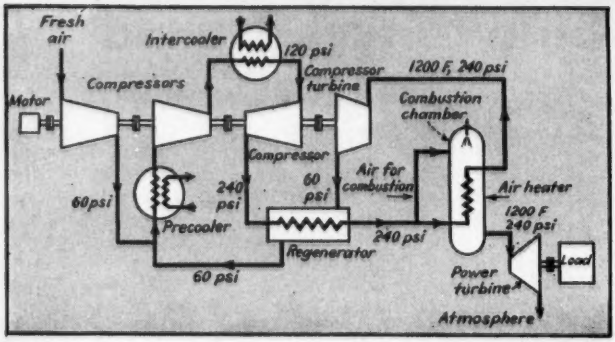
To withstand the high temperatures, the turbine's blades and disks are made of the recently developed high-temperature Timken superalloy steel, which includes 16% chromium, 25% nickel, 6% molybdenum. The heavy stationary parts are of an alloy steel containing 25% chromium and 12% nickel. To lengthen the service life, cooling air is directed over the face of the high-temperature turbine wheel and around the periphery of the second-stage diaphragm in such a way as not to incur power loss.

In the opinion of Vice Admiral Earle W. Mills, the Navy's gas turbine development program ultimately will result in a new type of ship propulsion power.

A 4,500-hp. oil-fired gas turbine will

There are separate turbines for compression and power in Navy test unit. Data are for full-load conditions.





SEMICLOSED GAS TURBINE—Sulzer Bros. turbine cycle develops diesel efficiency. Combustion gas heats air in closed circuit. Air compressed to 60 psia. joins flow. After cooling, total flow is compressed to 120 psia., intercooled, raised to 240 psia. Part is heated after regenerator, gives up heat to remaining portion, and leaves through power turbine. Remaining heated air expands through compressor turbine.—POWER

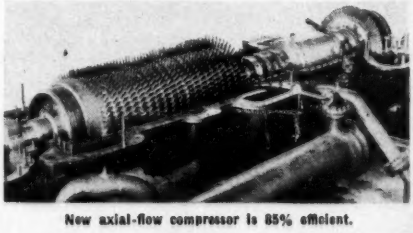
be built to power a locomotive. Two 3,000-hp. Elliott gas turbines operating at 1300 F. and 29% efficiency reportedly have been ordered for test installation on naval ships. Gas turbines have operated for 8 years in oil refineries, driving air compressors for the Houdry cracking process. —BUSINESS WEEK

Many special problems were solved in designing the Annapolis installation. In a special pipe-joint, expansion is accommodated by rotation of the adjoining members. High-temperature piping has an inner skin, or gas conducting member, over the walls of which there is no pressure difference. Mineral block insulation between the inner and outer wall keeps the latter cool enough to have the necessary physical strength. Bearing pedestals are cooled to prevent misalignment because of expansion.

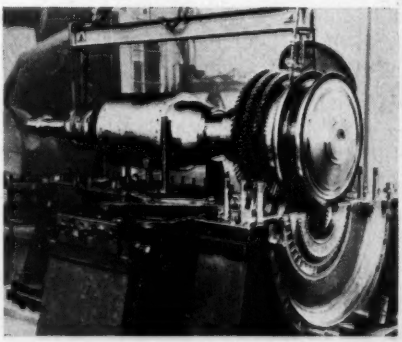
Operating on the parallel-turbine regenerative cycle, the unit compresses air to 45 psig., raises it to 750° F. by turbine exhaust gas in a heat exchanger. The air then goes to 2 combustion chambers, one of which supplies the gas-generator turbine driving the compressor, the other, the power turbine. With this arrangement, it is possible independently to control the power generated by the gas generator and power turbines, an operational advantage in marine service.

Running at the very high efficiency of 85% at full load of 40,000 cfm., the axial-flow compressor has 20 stages of airfoil section blades, so arranged that the air is accelerated by the moving blades, then slowed in the stationary elements to convert part of the velocity into pressure.

Each turbine has 2 impulse, 3 reaction stages. —ELECTRICAL WORLD



New axial-flow compressor is 85% efficient.



Turbine spindle has overhung disks and counterbalance.

Merges Labor and Capital

A plan consistent with the belief that every man should have a chance to "bet on himself," by having a voice in planning, a part of profits

An unusual plan of labor-dividends and multiple-management in 4 associated Spokane companies owned by Eric Johnston has given a lift to morale, increased employee interest, and inspired ingenuity throughout the plants.

For distributing a labor-dividend of 25% of profits (before taxes or dividends), a unit-system is used, each employee participating in proportion to his total units. 1 unit is given for each $100 of annual compensation, 1 for each year of continuous service, 5 for each 6-month term on Junior board of directors, 5 for supervisor, 15 for department manager, and various units for specialized personnel. No changes in wages, working conditions or in the amicable labor relations are involved in the plan.

In the multiple-management scheme, members of a junior board of directors are appointed from office, sales, and factory employees, by senior management. After the original selection, members are elected by the junior board itself, and an efficiency-rating ballot every 6 months keeps only best managerial material on the board. This group devises and presents finished plans based on employees' ideas. It has produced a billing-system resulting in substantial savings; it has created a voluntary job-training study program, increasing employee efficiency; it plans an orientation course for new workers, and devises local adjustments in the dividend plan.

In operation only a short itme, a full dollars-and-cents evaluation of the plan can not yet be made. Company executives advise: (1) formula is not automatic, and must be carefully fitted to company conditions, (2) program must be fully explained to employees, (3) plans are above zone of labor relations, (4) employees will react realistically, (5) plans must be sincere. Due to uncertain economic conditions, some precautions were necessary to apply the plan to 1946 operations. —FACTORY

SILVER CHLORIDE LENSES FORMED BY STAMPING

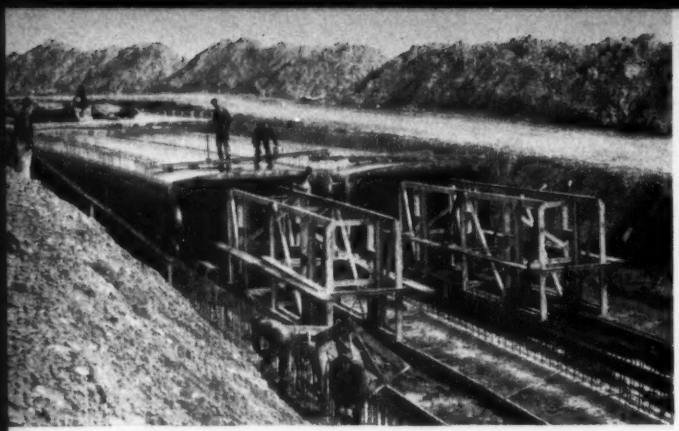
Now released from wartime secrecy, a new optical crystal grown from silver chloride is highly transparent to infrared and is valuable material for the windows, lenses, and prisms of the spectrometer, bolometer, and various nighttime detecting devices. Grown in the relatively short time of 8 days, it has an advantage over older synthetic optical crystals in that it can be rolled, stamped, or pressed into shape, without subsequent polishing. —BUSINESS WEEK

ATOM POWER TO BE TAMED

A pilot-size atomic plant, including chain-reaction pile and auxiliaries, to make controlled heat for generation of power, will be erected at Oak Ridge, Tenn., later this year. A demonstration unit, design will be based on research at the Metallurgical Lab., Univ. of Chicago. Monsanto Chemical is to have overall authority and responsibility. Allis-Chalmers, G.E., Westinghouse, and the military services will assist. —POWER

HOTHOUSE HORMONES

Consisting of indolebutyric acid and beta naphthoxyacetic acid diluted with distilled water, a new synthetic hormone called Indol will improve the fruit size and shorten the time of ripening of plants grown under glass. Eight oz. diluted to 1 gal. with distilled water treats 9,000 tomato plants, increasing the spring crop yield 15 to 25%. It is marketed by Cleveland Hothouse Vegetable Growers Cooperative Association, but only in limited quantity. —CHEM. & MET. ENGRG.



IN-STREAM CONSTRUCTION — A double box culvert leaves no room for bypassing stream flow. When water is low, a track laid on the culvert base carries 15-ft. traveling steel forms to move the collapsed form sections ahead. When high-water rushes, everything loose is removed by crane. Bolts for angle brackets which support outside wall form panels are replaced with lag screws and expansion sleeves placed through the base forms. In stripping, lag screws are removed, the forms lifted. —CONSTRUCTION METHODS

NEW METHODS FOR MINING MANGANESE

Many methods have been tried for commercially mining one of the world's largest undeveloped reserves of manganese, extending about 150 mi. down both sides of the Missouri River. In South Dakota, where the ore occurs in concretionary nodules with a shale matrix, a pilot plant has shown that satisfactory results are obtained using a granulator and conical rolls, with power-shovel-mined material. The conical rolls (one smooth shell and one spiral-groove shell) are two truncated cones, the surfaces of which are parallel at the line of closest contact. The clay passes down between the rolls, and the nodules ride atop the groove between the rolls. Replacing the power-shovel with a scraper, it was possible to bypass the granulator and reach a capacity of 39 tons per hour. Apparently scraper mining is successful only in weathered portions of the ore-bearing area.—ENGRG. & MINING JOURNAL

HYDRAULIC STEERING

Hydraulic power steering, developed by Bendix for tank retrievers, will be used on buses, trucks, well-drilling rigs, and earth-moving machinery. The device consists of a fluid reservoir, engine-driven pump, steering gear, control valve and power cylinder. When the steering wheel is turned by the driver, it moves a lever stud through the cam groove to rotate the pitman arm. The control-valve centering springs are preloaded, so the hydraulic system is cut in at a given steering-wheel effort, the power cylinder acting directly on the steering-gear lever. If the system fails, the vehicle can be steered manually.—PRODUCT ENGINEERING

QUICK-SEASONED WOOD

Railroad crossties have been dried from 80 to 30% moisture in 12 hr. with the new vapor method of Taylor-Colquitt Co. The wood is raised to high temperature in a closed chamber while protected against charring by an inert organic vapor, such as xylene, which boils at 280° F., or high-flash naphtha, with a boiling point of 330° F. Means are provided for withdrawing the rapidly vaporized moisture and recovering the organic liquid. As the final step, the organic material is removed from the wood by a vacuum in the drying chamber.

In addition to being faster than kiln drying, the process is reported to reduce checking in the wood and remove resins which might adversely affect paint. Commercial application is being made to ties and poles. Pilot-plant tests have been made on lumber.—BUSINESS WEEK

IN-PLANT CHLORINATION KILLS CANNERY BACTERIA

Studies of in-plant chlorination of the total water supply of 2 canneries and a freezing plant indicate that: (1) bacteria counts in the equipment are substantially reduced by using "sterilized" water (i.e., water treated beyond the break-point); (2) high residuals of free chlorine have no effect on the product; (3) no slimegrowths or off-odors occur where the sterilized water is used; (4) no corrosion of equipment can be attributed to the free residual chlorine. The chlorine dosage can be increased for clean-up periods. —FOOD INDUSTRIES

EMPLOYEE FORUMS IMPROVE EFFICIENCY

Group meetings held weekly on company time give Kellett Aircraft Corp. workers a chance to talk about grievances, get information on company plans and develop leadership qualities in foremen. The plan, now about 2 years old, replaces rumors with facts, assures rapid action on questions, repair requests and conservation campaigns, and builds morale. The half-hour meetings normally include a 15-min. talk by the foreman conducting the group session, then a 15-min. question-and-answer period. Forums are provided for requesting repairs, changes in physical facilities, or new tools, improvements, or safety suggestions. All such requests are granted or, if rejected, the negative action is explained. Dates of completion are given for changes requested. The result is a more closely knit organization, according to W. W. Kellett, president. —AMERICAN MACHINIST

CANADA FINDS MORE IRON

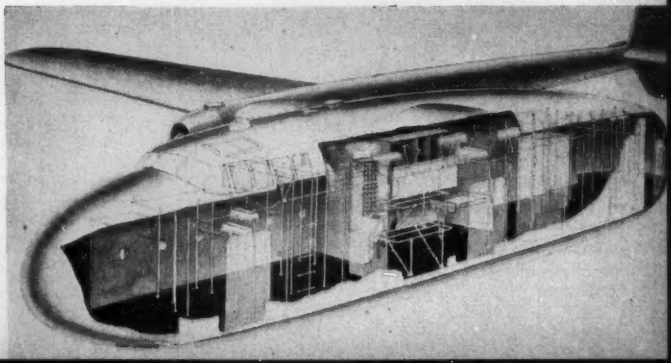
The third major iron ore body to be defined in Canada in recent years, a new deposit on the north shore of Lake Huron, which has a 68% hematite ore, will be developed by Westland Mining Co., Ltd. —BUSINESS WEEK

SOLVES EQUATIONS

Developed for computation of mass spectrometer data, a new 35x23x19-in. electrical computer also solves linear equations encountered in electrical circuits, aircraft-flutter analysis, and statistics. Based on the classical iterative method, it is 5 times as fast as mechanical calculators. Consolidated Engineering Corp. introduced it. —ELECTRONICS

HEART OF THE HOME

A factory-fabricated core containing furnace, water heater, plumbing vents and stacks, electrical connections, and controls forms the home utility unit developed by Ingersoll Steel & Disc. Around three sides of this core are assembled the kitchen, laundry, and bathroom fixtures of a well-equipped house. The unit itself weighs 1,180 lb., measures 30x77x90 in. It is concealed when installed. —THE WELDING ENGINEER



FLYING MAIL CAR— Ultimate transport of all first-class mail by air at 5c an oz. has been suggested by the Post Office Department, and Fairchild has designed this interior arrangement for a mail-carrying "Packet." Forward and rear compartments would contain bags of presorted mail, while 2 postal clerks would sort last-minute arrivals in the center compartment. Helicopters might take the mail to and from airport. —AIR TRANSPORT

Ways to Low-Cost Operation

Little ways of reducing factory costs add up to big-improvement importance, and they can be put into effect quickly

Motion economy— Painting narrow outside edge of a wood frame by drawing it over felt-covered rollers with cupped centers allows 1 to do work of 4; paint is supplied from an overhead container. . . . A $10 chuck that holds 6 spools on a spindle speeds winding of enameled wire; reels of wire are in parallel on a single shaft. . . . An 87% production increase resulted when an assembly job in which the left hand was used primarily for holding purposes was set up in the circular workplace manner for 2-handed work.

Materials handling—Handling costs were cut 30% when bag loading was simplified by tilting bags from the sewing platform to a system of endless belt conveyors and chutes which carry them into the railroad car, where one man can stack them. . . . Motor-driven side motion to shift forks 6 in. to either side of center on a tilting telescopic electric fork truck permits the load to be "spotted" in close quarters. . . . Container costs were cut 28% by using lighter crates reinforced with steel straps, and handling costs were less because a crate could be shipped on its side as a skid. . . . A small portable conveyor cut 62½% off loading time of boxcars by bringing bags or boxes to point where loader can stack them without moving about.

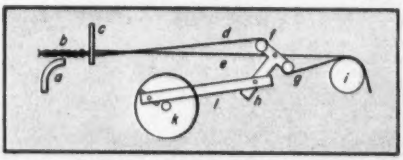
Buildings and services—Loudspeaking telephone in stockroom eliminates long walks that were necessary to answer calls on speaking tube; amplified microphone permits clerk to answer from anywhere in room. . . . Layout map of the plant, with all machines located by type and number, facilitates dispatching of maintenance men and tells them what types of tools will be required. . . . Spray heads, lines, and condensing tubes of an ice machine are kept clear by a low concentration in the circulating water of a chemical which controls formation of rust, algae, and slime.

Mechanical power drives—Maintenance of lineshafts has been reduced by putting them in trenches under the floors; the belt guard and trench cover to which it is welded are lifted for inspection or lubrication. . . . A centralized lubrication system for toggle presses in an automotive plant reduces down time from 1 hr. to a few minutes a day and saves direct labor. . . . A steel-wire manufacturer increased production 20% by installing individually motored variable-speed drives.

Heating, ventilating, air conditioning—Electrostatic dust precipitators on automatic glaze-sprayers avoids waste of glaze. . . . The chilling effect of opening and closing factory doors in winter is lessened by propeller-fan unit heaters blowing directly at the doors. . . . Placing a fan in the elbow of a duct to eject fumes from a nitric acid pickling tank avoids corrosion of the fan.—FACTORY

POROUS-STEEL FILTERS

A filter medium of stainless steel powder, the particles of which are welded together at points of contact to form a strong porous body, is an innovation by Micro-Metallic Co. In thin sheets, it can be bent about a small radius and fabricated by resistance welding. Porosities are 4 to 165 microns. —CHEM. & MET. ENGRG.



EXTRA LOOM PICKAGE—The Germans attained 8 to 12% additional pickage in weaving by using a cross-rod cradle (f-g) which applied extra tension alternately to one-half of the warp threads (d) and (e). Eccentric (k) is connected by (l) to cradle lever (h); (a) is breast beam, (b) is cloth and beat up, (c) is reed. —TEXTILE WORLD

DRUMS-CONTROL TORCHES

Four plastic drums, carrying lines of dots and scanned by photocells, control direction of the torch in a new pantograph flame-cutting machine. Drums are 5¼ O.D. by 10 in. high, mounted in pairs. One drum of the pair controls distance of movement, the other direction along a given line. Thus, any given contour is followed by "stepped" movements of the two carriages under control of all four cams. The unit reduces floor space required and lets the operator devote his time to the torches to improve the quality of the work. —THE WELDING ENGINEER

IMPROVED FORMULA FOR FLAMEPROOFING COTTON

The present satisfactory flameproofing treatment for heavy fabrics is unsuitable for clothing because of its limited resistance to hot alkali washing, its poor hand, and relative impermeability to air. A recently developed formula flameproofs certain outer garments, such as work uniforms, coveralls, and lifejacket vests.

Formula for 2½ yd. per lb. cotton drill

(A)	*Parts by wt.*
Urea-formaldehyde resin monomer	9.62
Catalyst for resin	0.40
Water	22.26
Chlorinated paraffin (70% chlorine)	14.40
Chlorinated paraffin (42.5% chlorine)	12.00
(B)	
Solvent (hydrocarbon, e.g., Stoddard solvent)	25.15
Oil-modified alkyd resin	3.89
(C)	
Antimony oxide, 300 mesh or finer	12.28

The solids in (A) and (B) are dissolved in the indicated solvents, then (A) is added to (B) with stirring and forms an emulsion into which the antimony oxide is dispersed.

A water-in-oil type emulsion reduces fire hazard, allows use of a water-soluble form of urea formaldehyde, and provides a medium for dispersing the antimony oxide. The urea formaldehyde acts as a binding agent, inhibits photochemical decomposition of the chlorinated resin and the cellulose, and absorbs any free chlorine formed. Application by 2- or 3-roll padder is simple. The proofed fabric, increased 30 to 60% in weight, is full, soft and waxy, and the proof withstands laundering. An afterglow persists 3 to 4 min., and the proofing cannot be used satisfactorily with lightweight materials. —TEXTILE WORLD

QUICK DUMPER—To trip this 4-cu. yd. concrete bucket designed by TVA, a workman rams the nozzle of a compressed air hose into a small socket at the base and turns on the air. In less than 2 sec. (7 times as fast as conventional types) the concrete is in the form. A compact counterweight, made of a half-circular segment of cast semi-steel, bolted and welded to a heavy iron wheel, permits dumping close to the form. —CONSTRUCTION METHODS

ALONG WORLD'S AIRWAYS

Australia and New Zealand will sponsor an airline from Sydney to San Francisco by way of Fiji, Canton Island, and Honolulu. Eventually it may extend to New Zealand and Vancouver. . . . Colonial Airlines has inaugurated direct air service from Washington to Ottawa and Montreal. . . . Tweed suits sent by air from England were in a Seattle store 72 hr. later. —AVIATION NEWS

A Pan American *Constellation* has made the first chartered flight over the 4,789-mi. Great Circle route from Tokyo to Seattle in 18½ hr., and weekly flights will service UNRRA in Shanghai and Tokyo temporarily. . . . United Air Lines has inaugurated daily flights between Los Angeles and San Francisco of the *Nurseryliner* on which only adults accompanied by children may ride and infants under 2 travel free. Stewardesses are nurses. —BUSINESS WEEK

FM GROWS RAPIDLY

In frequencies from 88.1 to 92.1 mc., FM has been used with spectacular success for educational purposes. More than 750 license applications have been filed by newspapers, labor organizations, present operators of AM stations, cooperatives, motion-picture interests, and politicians. Small transmitter FM equipment costs $15,000 to $25,000, and more than 2,000 stations are expected to be operating in the next 2 yr. —SCIENCE ILLUSTRATED

PETROLEUM PEROXIDE

Uniperox, a new organic peroxide developed by the Union Oil Co. of California, is regarded as an hydrogen peroxide in which one of the H-atoms has been replaced by a hydrocarbon radical. It is a clear liquid, slightly soluble in water, completely miscible with most organic solvents, petroleum products, and resin monomers. Quite stable, it is a good polymerization catalyst, and is useful in the manufacture of low-pressure laminates and castings. The addition of 0.5% to low-grade fuel raises the cetane number and improves cold-starting. It may be used as a germicide, fungicide, and insecticide. —CHEM. & MET. ENGRG.

PRODUCTS TO BE

Synthetic-rubber hose, reinforced with fiber-glass inner braid, has been developed by De Vilbiss for hot (300 F.) plastic paint application and similar uses . . . Apex has designed a washing machine with a "bouncing basket" of perforated aluminum and magnesium. The complete washing cycle, including fluffing after drying, is automatic and takes 25 min. . . . Phonograph records of Duraflex plastic, made by Majestic Records, Inc., maintain tonal fidelity and have less surface noise and scratch . . . Plastic-coated wire mesh for windows (Cel-O-Glass) is being applied in poultry houses and other farm buildings to pass the sun's ultraviolet rays . . . The new RCA 16-mm. sound-film projector has a 20-watt radio amplifier and 750- or 1,000-watt bulb. The reflector is Pyrex glass. The film gate is removable with one hand, and an embossed threading line makes it possible to thread the projector in the dark. Sound is stabilized, despite film-speed variations, by an oil driven flywheel. —PRODUCT ENGINEERING

NEW AUTO-PILOT DOES MORE

No matter what the attitude of the airplane when the new Grumman GR-1 automatic pilot is engaged, it will continue in that attitude instead of being jerked into straight and level flight, and no preliminary adjustments have to be made by the human pilot. The automatic pilot continuously synchronizes itself with the plane's position.

With this auto-pilot, dives, climbs, banks, coordinated turns, and climbing and diving turns can be accomplished by finger-tip operation of a 1½-in. lever.

Weighing but 27 lb., about 1/3 as much as conventional mechanical pilot, the GR-1 utilizes 2 displacement, 3 rate, gyroscopes. —AVIATION

Precision Casting Gains

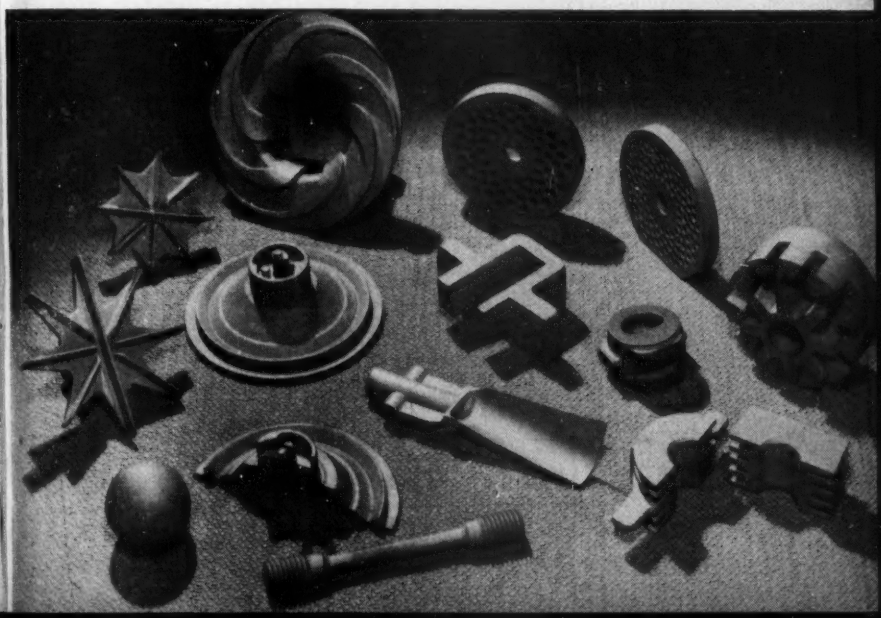
Allows engineer greater flexibility in designing machine parts, but method can't compete on cost basis when conventional metalworking does job readily

New freedom for the design engineer in determining the shape of a particular machine part, as well as the alloy of which it is to be made, is coming out of precision casting. Parts with shapes too intricate to machine or forge economically, or those made of superalloys too tough to form and finish easily by conventional machine shop methods, can be precision cast to tolerances of 0.003 in. or less with a dense, strong internal structure, thin edges, and a surface that requires practically no finishing.

The things that have been precision cast are too many to mention, but examples include bushings, gages, pump impellers, injector nozzles, multiple dies, scale pivots, valves, reciprocating slides, shoe sole and heel molds, textile machine parts, wearing plates, cathode mandrels, "squirrel cages," and cutting tools, as well as dentures, surgical appliances, and jewelry.

Although precision castings are made to some extent with metal patterns and split plaster molds, the lost-wax method is attracting the most attention. Dating back more than 2,000 years to the Chinese, the technique did not become important until the 1930's. Applied first to the forming of dentures, it soon spread into the jewelry manufacturing field, and was put to work during the war in the production of machine parts.

Perhaps the first among the precision casting companies to call the process a true mass production method. Haynes



Precision cast by the lost-wax method, intricate nickel-alloy machine parts illustrate what can be done with that metal-forming technique. Parts range from pump impellers to grinder plates and a jet-engine turbine blade.

Stellite reports improvements over prewar practices, including modern production-line layout, materials handling, and testing methods.

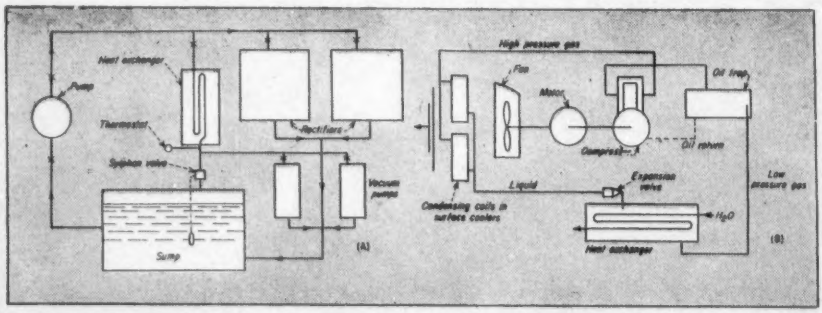
First comes the preparation of one or more master patterns or replicas, of the part to be cast, these being oversize by about 1¼% to compensate for the wax and metal shrinkage. Then the master patterns are used to cast a soft-metal die, with 1 to 20 cavities, and wax patterns are formed by injecting wax.

These wax patterns are then attached to wax gates and risers, and the assembly is dip-coated with a very fine silica which gives the castings their smooth finish. After the assembly has spent 22 minutes in a dehumidifying tunnel, a wax-paper-lined alloy "flask" is placed around it and filled with a chemically hardening refractory material.

The mold is then compacted by vibration, and is placed upside down in a continuous furnace to melt out the wax and burn away residue at temperatures between 1300° F. and 1900° F. Meanwhile, weighed charges of the metal have been melted in a small indirect-arc furnace, and the hot mold is clamped over the furnace pouring spout. The molten metal is poured by inverting this furnace, then air pressure forces the metal into all parts of the mold to produce sharp-edge, dense castings. After the metal has cooled, the mold is knocked apart to release the castings, which are cleaned by shot blasting after the gates and risers have been cut off. Rough inspection at this stage throws out obviously defective parts, and the others go to the grinding department where the gate areas are smoothed and irregularities removed. Next come sandblasting, dimensional checking, and fluorescent inspection to reveal minute cracks or other invisible surface imperfections. As a final check, the castings are x-rayed.

Inherently geared to relatively small parts, precision casting has been used by Austenal Laboratories to make a supercharger impeller 8 in. in diameter and toy-manufacturing dies weighing 7 or 8 lb. But the heaviest item now in mass production at the Haynes plant weighs about 1½ lb., though this is by no means the limit. There is no minimum weight, parts having been precision cast which are so small that it takes 500 to make a pound. And parts with edges as thin as 0.012 in. are in production.

Even the most optimistic of precision casters do not contend that the lost-wax process can compete on a cost basis with conventional metalworking methods when those methods will do the job readily. —BUSINESS WEEK



RECTIFIER COOLANT COOLED—Because the water available to an unattended substation of Northern Indiana Public Service Co. is contaminated with algae that quickly clogs piping, water for two 750-kw. mercury-arc rectifiers is recirculated (A) through a heat exchanger cooled by mechanical refrigeration (B). The exchanger, which contains the evaporating coils, is between the 30-gpm. cooling-water-pump discharge and the 40° C., 300-gal. sump tank serving the rectifiers. Cooling water for the condensate pumps is taken from the exchanger. —ELECTRICAL WORLD

CHINA GOES AFTER JAPAN'S TEXTILE MARKETS

With its goal the replacement of Japan in the world textile market, China is putting on a concentrated drive to expand her cotton mills through domestic manufacture of equipment, to adopt modern agricultural methods, to buy and produce modern spindles and looms, and to build up her merchant marine. Through subsidies, government operation of former Japanese textile plants in China, and the backing of shipping, banking, and insurance concerns, China's chances are considered good.

While the Japanese are still ahead in "know-how," and their textile rehabilitation may be rapid, their sales agencies were seized at the end of the war. Retail distribution channels in the Philippines, Siam, the Netherlands East Indies, French Indo-China, and Malaya, are largely controlled by Chinese merchants. Chinese technicians are studying American methods. —TEXTILE WORLD

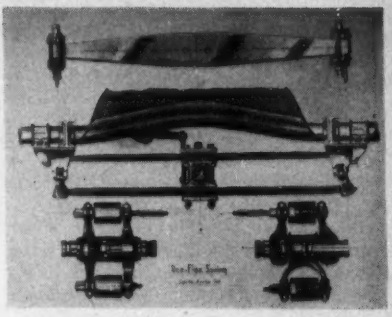
MACHINE SHINES SHOES

A nickel-a-shoe, coin-operated shine machine has separate sets of motor-driven brushes for black and tan and a lever for making the selection. After it applies the polishing wax, brushes travel over the entire shoe. Then a high-polish wax is applied to the toe and a special high-speed buffer gives it a gleaming shine. This machine of Coin-Arts Industries shines a shoe in 30 sec.—BUSINESS WEEK

NEW AIR SAFETY SYSTEM

A radar air-traffic control system has been developed by the I.T.&T. Federal Telecommunication Laboratories. Called Navar—navigation and radar—the system includes a ground-based control station with equipment for providing a radar "moving picture" of all air traffic in the area, together with a Navascope in the plane to which a similar picture is retransmitted from the ground station.

In the ground station, the radar picture not only appears in miniature on the viewing screen, but is projected onto a large map-of-the-area screen (Navascreen) on the wall. In the plane, the pilot views the Navascope through a translucent map of the control area so that he sees his own and nearby aircraft in relation to the physical features of the ground below and in relation to each other. —BUSINESS WEEK



DUO-FLEX SPRING—Half of the leaves are above the axle, half below, in the new ACF-Brill quick-response spring suspension for buses. Relatively few in number, the wide leaves provide sidewise stability, make ayes 75% stronger, permit more effective use of rubber inserts. Fewer leaves allow greater road clearance, reduce inter-leaf friction and squeaks, provide flexibility, cut oscillation rate. Steel spacers between leaves and lubricated pads at ends lessen break-away friction. Top surface of each leaf is shot-peened and edges are rounded to avoid fatigue cracks. There is no leverage between axle and Duo-flex spring when brakes are applied.—BUS TRANSPORTATION

TELEVISION FROM AIRCRAFT

One type of airborne television developed for military use has a 200-mi. range at 15,000 ft., employs 2 cameras, interlaced scanning with a field frequency of 40 and a frame frequency of 20, and gives a 567-line picture with high resolution. Under poor lighting conditions, the new image orthicon pickup tube is used in the cameras. This transmitter has a peak output of 1.4 kw. at 90 or 102 mc.

A shorter range (20 mi.) unit produces 40 frames per sec. in sequential scanning, giving a 350-line image, the transmitter peak power being 60 watts at 264 to 372 mc. —ELECTRONICS

New Plastics and Processes

Increased heat and moisture resistance, better strength and flow characteristics, and new materials feature developments

Wartime pressure resulted in new plastics, new processing methods and improved standard techniques. Here developments are summarized:

Polyethylene: High-frequency dielectric material originally developed for cable insulation has flexibility and toughness over a wide range of temperature, low-water absorption, and chemical inertness.

Cellulose Propionate: A new cellulose-base plastic having advantages in low moisture sensitivity and greater inherent plasticity, which give it better dimensional stability than acetates.

Silicone Materials: Developed basically from an organic-inorganic polymer in which silicon atoms carry one or more hydrocarbon groups. The materials have high heat resistance and excellent electrical insulation properties. Liquid types show little or no change in viscosity over wide temperature ranges. Forms include compounds and greases, fluids, varnishes and resins, and elastic materials.

Melamine: Basically manufactured from a trimer of a cyanamid and formaldehyde, these materials exhibit good arc resistance and impact strength, are available in a variety of colors.

Allyl Resins: Thermosetting materials derived from allyl alcohol or chloride, and cured by polymerization. Properties lie between those of the thermosets and the thermoplastics.

Styrene: New copolymers, having higher heat-distortion temperatures recently reached commercial development. Styrene was also applied in contact pressure laminating, in foamed resins, and in oriented matted fibers for low-pressure bag molding.

Other Developments: Vinyl materials underwent numerous refinements, and were used in new applications capitalizing on their elastomeric qualities. In the cellulosic plastics, flame-resistant molding compositions and carboxymethyl cellulose were developed. Thermoplastic laminates also were made successfully. In the phenolic fields, special attention was given to fillers imparting high impact strength, such as chopped tire cord. Extensive use was made of phenolic casting resins as foundry patterns, dies, and fixtures. Colored methyl methacrylate also became available. Progress was made in the extrusion, injection, and compression molding of nylon compounds.

New Techniques and Machines

High-Frequency Heating: Numerous refinements have made possible the molding of large, thick pieces. Molding machines incorporating this principle are under development.

Postforming of Laminates: This method, which utilizes inexpensive molds, is gaining wide acceptance for semi-structural and nonstructural parts of complex shape where a combination of strength and light weight is desired. Flat sheets are preheated and formed over wooden molds at pressures higher than 1,000 lb. psi. Developments in special laminating fabrics are now under way.

Low-Pressure Laminate Molding: Resins of the styrene-polyester, phenolic, allyl, and ethyl cellulose type are used in fabrication and forming of lightweight structures at pressures below 500 psi. and generally below 100 psi. utilizing the rubber-bag technique. Molds are cast materials, wood, or plaster of paris. Special filler materials are available. These include Mitscherlich paper, woven-glass fiber, and sisal. Strength properties of the low-pressure phenolic and styrene-polyester fiber-glass laminates—particularly impact, tensile, com-

pressive, and flexural—approach values which are of direct interest for structural design, although moduli of elasticity are low. Density approximates half that of aluminum and one-fifth that of steel.

Cellular Laminates: High-strength sandwiched materials, foamed resins, blown rubber, and balsa wood surfaced on top and bottom with sheets of low-pressure laminated materials, were developed. These were specifically used in the aircraft field.

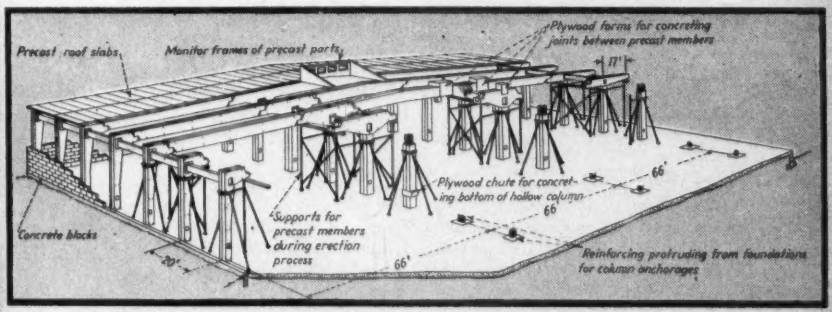
Friction Welding: In this technique the material is spun at high speed while in contact with the mating material. Frictional heat developed is sufficient to weld the two together. An ordinary drillpress can be utilized.

Expanded Resins: Chemical activation causes foaming of phenolics and styrene polyester resins into cellular structures which are nonpermeable and of low density. These materials can be expanded in place in the structure. They are first poured in as liquids, and as they foam they fill the space between the walls with a rigid, light-weight, porous mass, which not only adds to the strength but furnishes high heat insulating value.

Plunger Molding: A new machine combines high-frequency preheating, a pressure-type transfer mold, and a press with an auxiliary downward acting plunger. The plunger forces the preheated plastic to the bottom of a transfer pot while, by means of a pressure pad, it is deflected at wide angles along runners and gates into the cavities. This operation takes only a few seconds. The thin orifices between the runners of the cavity in the specially designed molds act as pressure-reducing valves and cause a rise in temperature of the material, thus reducing curing time, it is claimed.

Injection—Compression Molding: Another new machine incorporates both types of molding in one form, thus permitting the application of both techniques to thermoplastic molding. The advantages of injection molding, such as absence of flash and speed of production, are combined with the advantages of high pressure obtained by the compression stroke. The gates are removed automatically by the action of the machine. The machine is particularly advantageous for the production of heavy-sectioned thermoplastic parts.

Blow Molding: Hollow articles are now being molded by the blowing technique by two methods. In the first method a rod, sheet, or tube is blanked



QUICK CONSTRUCTION—Precast roof slabs and hollow-box rigid frames have permitted rapid erection of 1-story warehouses at low cost. The members, made of high early-strength reinforced concrete, were drained of excess water by the vacuum process. The same evacuating system energized suction pads of light steel frames faced with plywood and bordered with soft rubber gaskets, by which the members were crane-lifted from hinged forms. The roof-supporting columns and girders were assembled by bolting, welding, and concreting. Lightness and economy of material and labor were achieved throughout with this type of construction. —ENGINEERING NEWS-RECORD

ADJUSTABLE STEPS—Airliner door sills 86 to 126 in. off the ground can be matched by Glenn L. Martin Co.'s. adjustable ramp by varying the number of 8-in. steps from 11 to 16. Of aluminum alloy, the ramp is mounted on wheels. —AVIATION NEWS

out, reheated and blown to final shape. In another method, molding material is plasticized, formed into an intermediate shape and then blown into final shape.

Wood Molding: Wood is placed in an impregnation chamber under vacuum. Then, after all air has been removed, resin is admitted to the chamber and pressure raised to 150 to 350 psi. After removal, the preforms are air dried and then formed to shape. The solid preforms are first roughly formed to shape. —PRODUCT ENGINEERING

LINEN-LIKE RAYON

Yarns of viscose rayon, processed by the flax-spinning system, produce a fabric with linen-like qualities, but lacking firm texture and absorbent properties. The material is suitable for dress-goods, bed and table linen. Increased stiffness can be obtained by using a crease-resistant finish. Pins on the tow-finisher card cylinder should be set at 70°, on worker at 40°, on stripper at 35°.—TEXTILE WORLD

PAINT TO MATCH ANY HUE MIXED FROM 8 COLORS

A paint that matches any tone can be mixed in a few minutes by a painter or paint dealer with the foolproof Nu-Hue system developed by Martin-Semour Co. The tone desired is compared with 1,000 color samples conveniently mounted on transparent disks or on cards. On the back of the matching sample is its formula, based upon eight colors—yellow, red, orange, purple, blue, green, gray, and white, the specific amounts being weighed into a can and mixed. Large stores will have color "bars" with spigots from which the base colors are drawn into a can on exact-weight scales that slide along the counter. Costwise, these custom-mixed paints will compete with standard paints. —BUSINESS WEEK

TO GASIFY COAL IN GROUND

A research group has been created by the Russian government to resume experiments in underground gasification of coal. According to Russian engineers, 80 to 90% of the coal is utilized by this method, as against 60% under usual mining methods. Liquid or gaseous oxygen, prepared inexpensively, may be used in the process of burning the coal. Russian engineers are hopeful of working out methods of underground gasification of their vast deposits of combustible shale. —COAL AGE

PENICILLIN IMPROVED

Crystalline sodium penicillin which requires no refrigeration to preserve its potency, and is of a high purity that permits 200,000-unit dosage in the aerosol treatment of upper respiratory infections, has been developed by Commercial Solvents Corp. Other advantages are subcutaneous injection, and direct injection of large doses into the spinal canal in the treatment of the meninges, without evidence of nervous system irritation. Its potency in 1,400 to 1,500 units/mg. compared to 900 to 1,000 for the amorphous. —CHEM. & MET. ENGRG.

What's New in Aircraft

American, British, and Canadian manufacturers develop new and improved models of private and commercial planes and gliders for postwar market

Now under test, the 845-lb., single-seater, *Luscombe* Model 10 is all-metal except wing covering, has bubble canopy and fillets at wing roots and landing gears. Its 65-hp., 4-cyl. Continental engine consumes but 4 gal. of fuel an hour at 122 mph. cruising speed . . . To be test flown soon, the $1,800 Thorp *Sky Skooter* will carry 2, cruise at 100 mph., land at 35-40 mph., have a 400-mi. range, 16,000-ft. ceiling, 50-ft. take-off, 2-cyl., 50-60 hp. engine. Its free-moving stabilizer will be fitted with an anti-servo automatically to neutralize control surface in gust air. . . . Miles' (British) new all-wood 4-place, 2,800-lb. personal and charter plane, *Gemini*, cruises 130 mph. on two 100-hp. Cirrus Minor engines and ranges 820 mi. on 60 gal. of fuel. One-piece Perspex windshield is molded to contour of high-visibility front cabin section . . . The 81,500-lb. Douglas XC-112 transport seats 56 to 68 passengers, speeds 300+ mph. on four 2,100-hp. radial engines, has thermal anti-icing in wings, tail, windshield; floors covered with foam rubber; air-to-ground telephone. —AVIATION

Designed to meet the expressed requirements of Canadian air transport operators, the Fairchild F-11 *Husky* is an all-metal, high-wing, single-engine, general-utility freighter with a 240-cu.ft. cabin. To sell for about $33,000 with a used Pratt & Whitney Wasp SB3 or T1B3 engine, it is readily convertible from wheels to floats or skis. Payload as a seaplane is 2,900 lb., cruising speed, 130 mph., maximum gross weight, 6,300 lb. . . . Now going into production, the SGU-2-22 two-place glider has set a new national endurance record of 10 hr. 9 min. It has a 43-ft. spread, weighs 450 lb. —AVIATION NEWS

Commercial version of the Short *Seaford* military flying boat, the 75,000-lb. *Solent* carries 24 passengers by night, 36 by day, at 236 mph. cruising speed. Engines are 4 air-cooled radial Bristol Hercules 130. —AIR TRANSPORT

Scheduled to fly soon, the 90-ton Lockheed *Constitution* will carry 150 passengers in a double-deck fuselage. Powered by four 28-cyl. radial engines of over 12,000 hp. each, it will cruise 300 mph. and range 6,000 mi. —BUSINESS WEEK

32-POINT ENGINE-BORE GAGE—Each of 8 bores in an automobile cylinder block is quickly gaged at 4 points to show diameter, taper, and out-of-round with the new multiple-spindle Precisionaire developed by Sheffield Corp. Four gaging spindles elevate into each cylinder, and the readings are obtained from the positions of little floats in graduated glass air-flow tubes, there being one tube for each spindle and an adjustable Go, No-Go tolerance gage across the 4 tubes for each cylinder. Out-of-round is checked by rotating the spindles through 180 deg. As the bores are gaged, the size classification is stamped on the block permitting selection of pistons that give the proper fit in the cylinders. —BUSINESS WEEK

TECHNICAL SHORTS

Industrial Talcum—To test for leaks in auto bodies, makers sprinkle talcum powder inside door and body joints, then drive past huge wind machines. Dispersed talcum indicates a leak. —AMERICAN MACHINIST

Highway Radiotelephone—Trial mobile radiotelephone service along 1,000 mi. of intercity highways is planned. Suitably equipped vehicles on the highways or boats on adjacent waterways will be able to make and receive calls to or from any Bell System telephone in the country. —ELECTRONICS

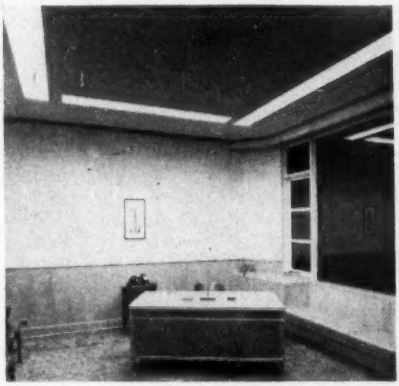
Production at a Glance—Plastic strips of different color are snapped into horizontal channels of the Visi-Trol board to show the production status of several items against scheduled production. Numbers and letters are inserted to give other information pertinent to production control. —BUSINESS WEEK

Photocell Tests Metal—Ford is using a sampling gun to draw over 1200 hot-metal samples daily at the Rouge foundry. Over ½ mile of 10-in. Pyrex glass tube is used daily. Two pieces of each sample are ground, and placed end-to-end in a holder to pass a 35,000-volt spark for 45 sec. The heated sample radiates light, which is color-separated by a prism. Percentages of element in the sample are determined automatically by a photocell which magnifies radiation 200,000 times, then records intensity, rather than color, on a meter. —AMERICAN MACHINIST

Milling by Weight—Held in a fixture attached to two scales, a connecting rod is weighed for balance after milling, without removing it from the new machine tool of Snyder Tool & Engineering Co. —BUSINESS WEEK

Ballasts Omitted; $72,000 Saved—In an Oklahoma City plant, sequence starting of fluorescent lamps saved $72,000 by eliminating 12,000 ballasts. The 265 volts necessary for sequence starting was taken from a 460-volt Y distribution system without transformation. —ELECTRICAL WHOLESALING

Purposeful Package—A new plastic inner envelope developed for packaged oleomargarine by Visking Corp. is tough enough that the product can be kneaded without breaking the envelope. This permits coloring, contained in a capsule which is broken inside the envelope by squeezing from the outside, to be mixed into the margarine without unwrapping the product. —BUSINESS WEEK



LIGHT FOR EXECUTIVES—Rectangular design with 2-lamp, 40-watt, separately controlled troffer units provides uniform and flexible illumination for the private office. With all units on for conferences, the light intensity is 43 foot-candles. —ELECTRICAL WHOLESALING

String Charts Save Time—To show a given bus route and type of service, Eau Claire Transportation Co. sticks pins in a chart at each time and terminal line involved in the route and runs string of a certain code color from pin to pin. Changes can be made readily to accommodate continuously fluctuating schedule. —BUS TRANSPORTATION

Torsion Spring Equalizer—The free ends of the torsion bar springs on the Freuhauf trailer are geared together so that the load is equally divided. —BUSINESS WEEK

Electronic Toy Control—Carrier impulses of 10 different medium frequencies are sent through the track to control as many operations of a toy electric train developed by Lionel Corp. —ELECTRONICS

Silicone Defoamer—Called the cure for troublesome foaming in the processing of aqueous solutions and emulsions, DC Antifoam A is a new Dow-Corning Corp. silicone compound effective in concentrations as low as 1 ppm. for weak foamers. This colorless, tasteless, almost odorless, chemically inert, semiorganic substance has been test-applied to soap solutions, cutting-oil emulsions, egg albumen, rubber latex, and paints. —BUSINESS WEEK

Quick Housing—Using movable two-story forms which carry inserts for windows, doors, pipes, ducts, and other openings, 12-in. concrete house walls are being poured in Britain with a minimum of labor. Cranes handle the forms, and an open-front design permits withdrawal. —CONSTRUCTION METHODS

New Color Technique—A 30x40-in., 4-color reproduction is made by overlaying red, blue, and yellow transparencies made in 10 min. on the Ozaloid machine for reproducing engineering drawings. Cost per "print" is $4 after the color separation positives have been made. —BUSINESS WEEK

Helium Welding—A wartime development, the Heliarc welding torch has proved invaluable in fabricating magnesium and stainless steel. Helium bathes the work to eliminate the use of a flux and subsequent corrosion of the metal. —MILL SUPPLIES

Coffee Roaster for Stores—About as big as a cash register, a grocery-store electronic-infrared coffee roaster developed by A. S. Torres, produces 1 lb. in 2 min.—BUSINESS WEEK

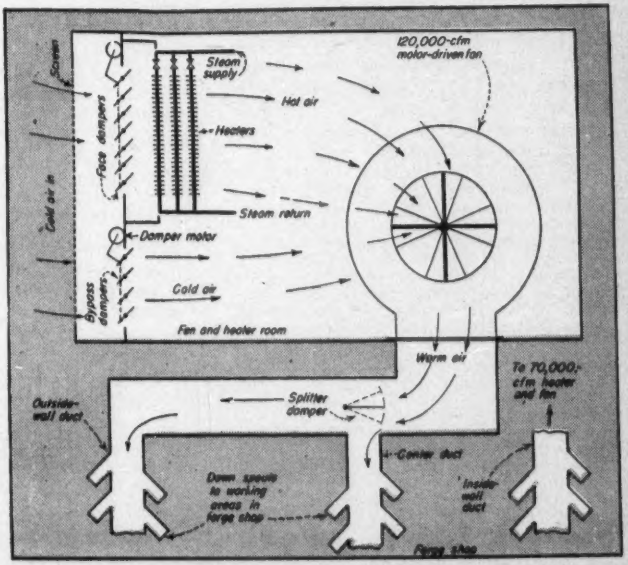
Shock Absorbers—Rollers equipped with pneumatic tires cushion the 36-in. conveyor belt which hauls 450 tons of coal, rock, and shale per hour from Shenandoah, Pa., mines. Closely spaced six-ply tires absorb the shock of the heavy falling material at the dumping point. —CONSTRUCTION METHODS

Ghost Buses—Greyhound Corp.'s 4,500 buses will glow in outline at night by the reflected light of other vehicles. They are being trimmed with a plastic film in which there are thousands of microscopic glass lenses per sq. in. —BUSINESS WEEK

Flexible Gage—To speed insertion in holes, increase sensitivity, and reduce chipping and breakage from binding of synthetic-sapphire plug gages, Elgin National Watch Co. is replacing plastic handles with flexible rubber ones. As a result, the operator can obtain perfect alignment even though the gage is 20° off the hole axis.—AMERICAN MACHINIST

Starter-Generator in One—One winding serves both starter and generator functions in a ½-normal-weight internal-combustion-engine auxiliary introduced by Electric Engineering & Mfg. Corp. Special gear design provides a speed reduction of 23 to 1 for a starting torque of 160 ft.-lb. and 2½ to 1 for generating 500 watts. —BUSINESS WEEK

Simpler Fuel System—All the internal fuel is carried in one tank in the Douglas BT2D-1 "Skyraider" dive bomber, compared with 5 in the BTD, saving 270 lb., reducing tank-replacement time from 72 to 1.6 manhours, eliminating tank switching, and cutting fueling time for the airplane from 13 to 5 min. (1 man). —AVIATION



DUAL FORGE - SHOP HEATER — To control heating and ventilation in its forge shop so that all employees work under proper conditions, Wyman - Gordon has installed a dual air-heating system. One part provides 120,000 cfm. of air to outside-wall and center-aisle areas, the other circulates 70,000 cfm. along the inside wall. Cold air comes into a penthouse atop the boiler room passes through regulating dampers, some leading to heaters. A splitter damper in the outlet of the larger fan makes it possible to provide more heat to the outside wall in winter, and more cool air to center section in summer.—POWER

Industrial Fate of Germany

Control Council cuts overall production goals to about half 1938 level. Many industries are barred altogether and others face sharp curtailment

Allied plans for the postwar German economy will result in a reduction of the overall level of industry (excluding building and building materials) to between 50% and 55% of the 1938 level.

Prohibited industries include all those directly related to war: synthetic gas, oil, rubber, and ammonia; ball and taper roller bearings; heavy tractors; primary aluminum; magnesium; beryllium; vanadium produced from slag; radioactive materials; hydrogen peroxide above 50% strength; specific war chemicals and gases; and radio transmitting equipment. Steel, nonferrous metals, chemicals, dyestuffs, pharmaceuticals, and synthetic fibers are to be restricted. So will be the machine-tool, heavy-engineering, and heavy electroengineering facilities.

Production of coal and potash are to be unrestricted, with minimum rather than maximum targets. Within the limits of available resources, these industries have been given a free rein: furniture and woodwork, glass and ceramics, bicycles, and small motorbikes.

Highlights of the production plan are:

Steel—Production is limited to 5,800,000 metric tons, capacity to 7,500,000 metric tons, to be obtained from the oldest German mills. Newer plants will be dismantled. At the war peak, Germany had 25,000,000-ton capacity and production of 21,500,000 tons.

Automotive—Production is set at 40,000 passenger cars, 40,000 trucks, and 10,000 motorcycles. In 1937, Germany produced 331,000 units in these three categories.

Tractors—Production is set at 4,000 light road tractors and 10,000 agricultural tractors.

Coal—Production is set at 155,000,000 metric tons "coal equivalent" (including considerable tonnage of brown coal). In 1937, Germany produced about 228,000,000 metric tons, comprised of 187,000,000 tons of coal, and about the same quantity of brown coal (equivalent to 41,000,000 tons of hard coal). From the anticipated coal output, 45,000,000 tons will be for export.

Potash—Production is set at 100% of 1938 output, or about 2,000,000 metric tons.

Cement—Production is set at 8,000,000 tons. In 1938 Germany produced 15,600,000 metric tons.

Electric power—Capacity is set at 9,000,000 kw. In 1937 German capacity was about 22,000,000 kw.

Textile fibers—Output is set at 665,000 metric tons, of which 20% will be allocated to export. In the years before the war Germany imported about 400,000 tons of cotton and produced 450,000 tons of rayon fiber.

Pulp and paper—Production will aim at a figure of 2,129,000 tons, of which 400,000 tons will be exported. German paper production in 1937 was 2,836,000 metric tons.

Rubber—Consumption is set at 50,000 tons —20,000 tons from reclaimed materials, and 30,000 tons from imports. Germany had 100,000 tons of synthetic capacity which will not be used.

Railroad equipment—Output will include 30,000 freight cars, 1,350 passenger coaches, and 400 baggage cars. Locomotive works will be engaged solely in repair work until some later date when new production is approved.

Exports—Volume is set at 3,000,000,000 reichsmarks (of 1936 value) in 1949, with imports of the same magnitude. In 1936 German imports totaled 4,210,000,000 reichsmarks against exports of 4,768,000,000 reichsmarks.

Big cutbacks—Other industries with multifarious output have been cut back to set percentages of prewar production (1938) as valued in 1936 reichsmarks. The machine-tool industry is to retain only 11.4% of its 1938 capacity, and the type of tools produced will be strictly limited.

Heavy engineering industries will be cut back to 31% of 1938 capacity—including production of heavy mining equipment, boilers and turbines, prime movers, compressors, and turboblowers. Other mechanical engineering (including production of construction equipment, textile machinery, and other small tools and consumer-goods equipment) will be cut back to 50% of 1938 capacity.

Electroengineering production capacity is to be cut back to half of the 1938 level, but capacity to produce heavy electrical equipment is trimmed to 30% of 1938.

—BUSINESS WEEK

HEAT PUMPS COMING

Interest in the heat pump as a practical house-heating and air-conditioning device has increased considerably in the past year. Ohio Power Co. is installing a 15-hp. unit, using air as the heat source, in combination with an off-peak heating and cooling storage tank. Two manufacturers have placed self-contained 3, 5, 7½ and 10-hp. heat pumps on the market, these using either air or water as the heat source. Utility companies have sent to 11 manufacturers tentative specifications for a self-contained heat pump, the ultimate intention being to produce 1,000 such units.

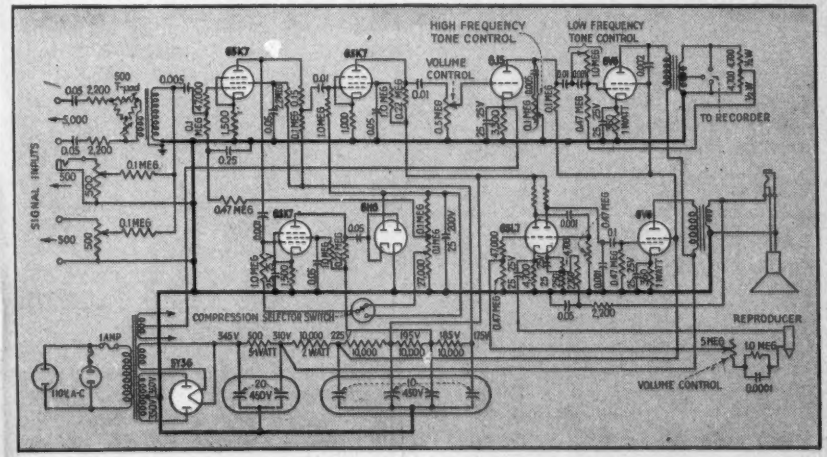
The domestic hot-water heat pump has tremendous possibilities for the immediate future. A ¾-hp., 50-gal. installation taking heat from the air and storing water at 130° F. has a coefficient of performance of 3, and 4 or 4½ is obtainable. Cost in quantity would be reasonable, maintenance no greater than with present-day refrigeration. Power consumption, compared to that of an electrical resistance water heater, could be reduced ⅝ to ¾.

—ELECTRICAL WORLD

GERMANY IMPROVES JUICES

During the war, German fruit-juice technologists used deflavored fungus mycelium to produce the enzymes which hasten the "mellowing" of clear-filtered fruit juices and wines. They also filtered clarified juices free of microorganisms, germproofed them, and stored them under carbon dioxide at 8 atmospheres, thus producing (at a rate of more than 800,000 gal. annually) a product superior in flavor and aroma to flash-pasteurized juices. The Germans used a revolving, refrigerated drum to achieve continuous freeze concentration, and their studies indicated that ultraviolet light will pasteurize milk and probably fruit juices as well.

—FOOD INDUSTRIES



RECORDERS IN INDUSTRY—A type of recording-reproducing equipment developed for war service is finding use in government and commercial installations, in airport control towers, radio communication stations, and railroad train traffic control. Flight instructions from the airway traffic control center, as well as replies from pilots, are recorded for quick playback so that procedure may be studied and improved or the cause of an accident determined. Railroad switching and dispatching instructions are recorded for like reasons, as are power station switching orders. Recordings are on flexible, plastic belts which can be filed. Recording is effected with an electromagnetically operated needle, and reproduction is accomplished through a needle-actuated crystal pickup. The recording and reproducing amplifier circuit (above) has automatic volume compression and high- and low-frequency compensation to improve intelligibility of low-velocity recordings.

—ELECTRONICS

MACHINE WRAPS ODD SHAPES—Products heretofore hand-wrapped because of their odd shape are handled by the new Stretch-wrap machine of Goodyear Tire & Rubber Co. Two continuous sheets of Pliofilm are passed over heated rollers and between two Airfoam rubber belts which seal the film tightly around chickens, vegetables, hardware, and other objects of irregular outline, forcing the air out as seal is made. —BUSINESS WEEK

CRUDE OIL DESALTED

Crude oil high in salt content may be treated by a new inexpensive process to make it less corrosive to refining equipment. Proved in pilot-plant operation, the technic is to wash the crude with water at 250° F., pass the oil and water through beds of fine glass fibers to coalesce the emulsified water, and then separate the desalted oil from the aqueous phase. This reduces the salt content of the oil from 65-272 lb. per 1,000 bbl. to less than 5 lb. —BUSINESS WEEK

CADMIUM RECOVERED FROM FUME

Although the cadmium content of Bunker Hill lead receipts is about 0.05%, plans were developed for a combined leach and retorting process capable of producing 1,000 lb. of 99.95% grade metallic cadmium per day. The volatility of cadmium at prevailing lead-smelting temperatures results in its concentration in fractional portions of the fume collected, which comprise a continuous circulating load in the smelter system. A concentration of 3% cadmium in baghouse fume is readily obtained, and is fused with silaceous flux, the bulk of the cadmium being vented as a volatile oxide. The cadmium fume, thus concentrated to a grade approaching 27% cadmium, is collected in a separate baghouse section.

The fume is broken up in a ball mill containing water, $NaClO_3$, and $KMnO_4$. It is fed into a lead-lined leaching-tank containing water, copperas, $NaClO_3$, and sulphuric acid, then precipitation is accomplished with H_2SO_4 and zinc dust. The resulting sponge is granulated, densified, and discharged as briquettes. Oil-fired retorts heat the briquettes with coke, and the molten cadmium is poured into molds. Candle-wax prevents excessive oxidation and NH_4Cl removes thallium. —ENGRG. & MINING JOURNAL

INDIUM BEARINGS BEST

Silver-lead-indium bearings have been standardized for aircraft engines after demonstrating superiority over cadmium-silver-copper bearings in months of operation in military planes. Silver, which resists failure from fatigue, is coated with a thin layer of lead for oiliness. But lead is soluble in organic acids present or formed in lubricating oils, so a thin layer of indium is applied to it by electroplating. —AVIATION NEWS

FOR ELECTRICAL LIVING

There are no lighting fixtures of the usual type in the postwar home built by Fritz B. Burns Research Division. All lights are flush in the ceilings or in coves, except for table lamps in the master bedroom. There are no button or toggle switches—you simply push on the plate with hand or elbow. Slimline and Circline fluorescents are used profusely in combination with reflector-type incandescents behind glass bullseyes in the ceilings. Spot lights and flood lights are used in the patio and gardens, some with bulbs containing spectrum colors in glass to bring out flower effects resembling technicolor. All lighting is controlled by secondary relays.

Of the most advanced design, the electrical and gas appliances include a range with the heating elements in the back and table room in front, a complete electric laundry in cabinets in the kitchen, a refrigerator and frozen food cabinet, and a built in sewing machine and mixer which swing out for use.

Cupboards and drawers for dinnerware and cutlery are constantly kept sanitary by bactericidal lamps. Everything in radio is provided through a master unit in the living room, and there are receivers all over the house. The system supplies a-m and f-m radio reception, wired music, or recorded music at any point desired. A television set is included, too.

Dust in the house is eliminated by an electrostatic precipitator placed ahead of the heating and air-conditioning equipment. —ELECTRICAL WHOLESALING

OZONE CUTS METAL

In one recent experiment, aluminum 0.065 in. thick was cut at a reasonable rate by a 70-lb. air jet passed through an ozone generator and entraining heated water. The jet, 0.016 in. in dia., cut a 0.020-in. kerf. Apparently, ozone released by the jet corroded the metal surface, creating an oxide which was scaled off by the water. The water also pitted and eroded the surface—erosion and corrosion working together at cutting speed. Ozone released must be collected or dissipated before it harms the operator. —AMERICAN MACHINIST

Food-preparation center in modern house built by Fritz B. Burns, now president of Kaiser Community Homes, a $5 million corporation organized to build low-cost residences. Visible are new rear-burner range (left), new Kaiser hydraulic dish washer (in rear), and console-type refrigerator (right).

Progress in Road Building

Best practices in compacting sandy subgrades reported at annual meeting of Highway Research Board. Recommendations made for other improved methods

Recent studies report several innovations in compacting sandy subgrades. Test sections contained an average 5-ft. thick top stratum of sand, density 85 to 90% of maximum, and compaction equipment ranged from tractor to 60,000-lb. wheel load. It was found that: additional water by sprinkling or ponding does not add to degree of compaction; increase in density can be secured more easily by using a small number of heavy-load coverages; after 6 coverages, the benefit of further coverage is slight; moderately light grading increases density 7% in top 2 ft., 3 to 4% to 5-ft. depths; subgrades can be compacted to heavy bomber requirements by 25,000-lb. wheel loads.

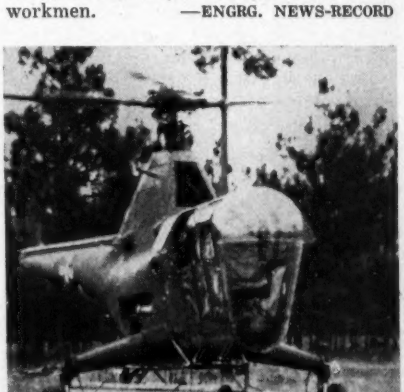
Some recommendations: mixing of soil and soil-aggregates should be done in more efficient mechanical mixers; equipment is needed for one-pass compaction, thus producing uniform results, saving time and money; denser and thicker subgrades should be used, since load-carrying capacity can be attained most economically in this manner; in specifying the degree of density, more attention should be given to strength of the compacted mixture; a strength index test should be established; laboratory and field tests on density should be correlated; contractors and field personnel need to know basic principles of soil compaction.

The subgrade quality, particularly in the softer range, has a great effect on pavement stress, but a point is reached as quality is built up where cost of improvement is out of proportion with decrease in stress. Doubling the total load increases maximum pavement stress about 85%. A ½-in. increase in pavement thickness reduces load-stress 10%, but additional thickness is less effective.

The capillary or pressure potential concept holds considerable promise for practical application to subgrade-moisture problems, particularly in flexible type highway and airport pavements. There is need for much long-time, permanent-station study of moisture conditions, temperature fluctuations, groundwater fluctuations and capillary potentials, using automatic recorders.

An analysis of maintenance expenditures over a period of years on representative sections of road discloses 45% for labor, 21% for materials, 25% for equipment, 9% for overhead.

Assured continuity of service, fair wages adjusted by job evaluation, and a retirement plan will ensure higher efficiency and quality on the part of trained workmen. —ENGRG. NEWS-RECORD



LAYING PIPE BY AIR—When the engineers laying a petroleum pipe line encountered impassable swamp lands in Louisiana, 20-ft. lengths of pipe were delivered to the pipe-laying crews by helicopter. The aircraft was able to hover above marshy ground, without landing, while the men removed the pipe. —BUSINESS WEEK

NEW FINISHES GIVE FABRICS SPECIAL QUALITIES

There is a bewildering number of new textile finishes and treatments for cotton, wool, rayon, linen, silk, Fiberglas, and nylon to impart crease-resistance, shrinkproofing, water repellency, flame proofing, mildew resistance, dimensional stability, softness, stiffness, permanent glaze, or greater strength.

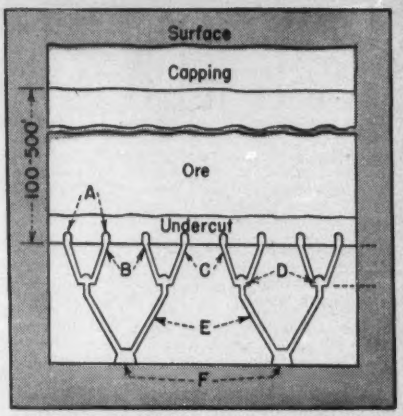
Partial acetylation of cotton makes it rot-proof, newer melamines not so retentive of chlorine are promising for crease resistance, wool shrinkproofing, and binding of pigment dyes. Cationic softeners complement these resins to produce a full soft hand. Application difficulties have held back use of colloidal dispersions of silica for air-permeable water repellent fabrics. Wax types seem to be favored for rainwear, table covers, curtains. Vinyl resin coatings are fully waterproof, soft or stiff, thin or heavy, and are used on many fabrics.

Other coatings are cellulose acetate, aceto-butyrate, aceto-propionate, ethylcellulose, phenolics, alkyds, urea-aldehyde, butyral, acetals, acrylates, methacrylates, chlorinated rubber.

Many of the treatments to stabilize rayon fabrics are fine coatings, such as alkali-soluble cellulose. These adhere to the individual fibers and can be softened or stiffened as desired. Resin-treated spun rayon cloth is used in cool, crease-resistant suits. —BUSINESS WEEK

FACTORY LIGHTING WILL BE DIFFERENT

Twenty years of industrial lighting progress has been crowded into the past 5 years. Foot-candle levels will be 75 to 150 for general illumination, with much attention to the structural details of the installation. Large groups of lamps may be operated from a single ballast for fluorescent lighting, which will require high-voltage service and new technics. There is a definite tendency toward standardization of transformers to provide the same service voltage for both power and lighting, with obvious savings. Branch circuits will be carried through the lighting fixture itself to save labor and materials. Control systems will be simplified by using relays on high-voltage service. Groups of lights, perhaps entire bays, will be switched as a unit, rather than individually. Today, lighting is a system which cannot be divorced from the electrical systems of factories. —ELECTRICAL WHOLESALING



BLOCK-CAVING SPEEDS MINING—The best block-caving mines have a production-rate of more than 32 tons per man-day, considerably in excess of most underground methods. Thus low-grade orebodies are being profitably mined. In one method the ore, broken by fall, flows through draw-points (B) and the fingers (C) to the grizzly level (D) where it is further broken by sledging or blasting, and transferred (E) to the haulage drifts (F). In the other method, shrinkage stopes around the periphery of the block free it from laterally surrounding material. A retreating undercut induces spalling, and the caved material is drawn sufficiently to cause failure in overlying rock beds. —ENGRG. & MINING JOURNAL

SYNTHETIC MOTOR OIL

A non-petroleum motor lubricant which flows freely at 30° F. below zero, does not thin nor break down at high temperatures, and cleans motors gummed and sludged by ordinary oil has been perfected by Carbide and Carbon Chemicals Corp. It has been used in Army trucks and in aircraft. —BUS TRANSPORTATION

NEW PRODUCTS

Miniature Ball Bearings—Designed for small motors and computers, new ball bearings of 5/16-in. outside dia. and bores of 7/32 to 4/32 in. are made by Miniature Precision Bearings of chrome steel. —AVIATION

Smokeless Stove—Utilizing a down draft to pass the combustion gases through hot coals, the new stove of Phillips Mine & Supply Co. produces no smoke. —BUSINESS WEEK

Liquid Insulator—Automobile ignition systems are said to be insulated against current leakage and deterioration by acids, alkalis, and oils, as well as proofed against moisture, by a liquid insulator compounded by Lumanize Products Co. —BUS TRANSPORTATION

Clothes Packager—Shirts, pillowcases, infants' underwear, handkerchiefs, towels, and other textile products can be wrapped on a card and packaged at 40 per min. in a machine developed by Package Machinery Co. It makes a single-point twin underfold and will handle packages 4 to 12 in. long, 3 to 5⅞ in. wide and ⅛ to 1½ in. high. To spot brand or trade name where desired, an electric eye is used. —PRODUCT ENGINEERING

Lathe Becomes Screw Machine—In 2 hr. a standard Atlas or Logan lathe can be reversibly transformed into a small-parts automatic screw machine by an attachment developed by Dunn Engineering Co. Face cams operated from the lead screw actuate arms to control cutting. —BUSINESS WEEK

Kills Sun Glare—Reflected sun glare which distracts automobile drivers and causes eye fatigue and discomfort is removed by Polaroid Corp.'s new polarizing plastic visor. It is in a frame for slip-on attachment to the sun shield. —BUS TRANSPORTATION

Remote Speed Changer—A control motor applied to a variable-speed transmission and connected by a flexible shaft to a remote control box comprises the Electrol introduced by Yardeny Laboratories, Inc. When the dial is set the changer follows as rapidly as the electric servo-motor can drive the adjusting screw. —CHEM. & MET. ENGRG.

Three-Wheel Truck—Handling ½-ton, 23-cu. ft. loads, the new 3-wheel utility truck of Toolcraft Mfg. Co. travels 35 mph., goes 60 mi. on a gal. of fuel. Fluid drive eliminates gear shifting. The 2-cyl., 4-cycle, air-cooled motor develops 8½ hp. Wheel base is 66 in., turning radius 14 ft. —AIR TRANSPORT

For Printing Circuits—When the new Metapaint dries, it forms a silver conductor and can be used to print low-current electrical circuits or circuit elements such as inductors. This Metaplast Co. product also can be sprayed on nonconducting compartments to form shields. —ELECTRONICS

Valve Rotater—Increasing valve life and improving engine performance, the new spring retainer Rotocap of Thompson Products, Inc., consists of 2 caps held apart by a conical spring-steel washer. Ball bearings on inclined surfaces in the lower cap normally are held at the high end of the inclines by springs. But as the valve lifts, the pressure on the upper cap pushes the washer against the balls and the balls against the inclines, rotating the bottom cap and the valve. —BUSINESS WEEK

Rotating Pipe Coupling—A new ball-bearing ⅛- to 1-in. swivel pipe coupling with multiple synthetic packings and metallic seals to prevent leakage, turns easily at pressures up to 3,000 psi. It was designed by Snyder Sales Corp. for an average speed of rotation as high as 250 rpm. —CHEM. & MET. ENGRG.

Repeating Flash Bulb—Designed to operate several thousand times, a new Sylvania Electric Products flashbulb generates a 1/5,000-second flash and delivers 12,000,000 peak lumens of daylight quality by discharging electric condensers through a xenon gas-filled spiral tube. —BUSINESS WEEK

SCOOPMOBILE—With front-wheel drive and single rear wheel, this Mixermobile unit is extremely maneuverable. With interchangeable attachments, it can be used as loader, dozer, lifting machine, concrete buggy, lumber handler, or hoisting boom. —ENGINEERING NEWS-RECORD

Featherweight Foamboard—Resembling hard sponge and weighing but 1 to 3 lb. per cu. ft., a heat and sound insulating material developed by Foster D. Snell is made by foaming glue in aqueous solution and drying it. Rubber, asphalt, or fibers may be included for special properties. —BUSINESS WEEK

2-in-1 Wood Stain—Filcotone, a cost-saving combination stain and filler in all standard colors for wood furniture finishes, has been introduced by Glidden Co. A single application stains, wash-coats, and fills. It air-dries in an hour. —CHEM. AND MET. ENGRG.

Plastic-coated Hand Rails—Electric-welded, 1 3/16-in. steel tubing, mechanically coated with 1/32 in. of white, red, grey, blue, brown, green, or yellow plastic has been introduced by Samuel Moore & Co. for use in stanchions and hand rails for buses, trolleys, and subway cars. The tubing can be bent after coating, can be made in any length. Marproof, self-cleaning, high in dielectric strength, unaffected by perspiration or salt air, plastic-coated stanchions are rated 20% lighter, 25% less expensive, than conventional stanchions. —BUS TRANSPORTATION

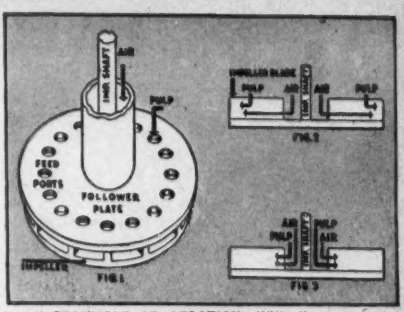
Two-temperature Water Heater—140° F. water is available from a storage tank and 180° F. sterilizing water is delivered instantaneously by heat boosting in A. O. Smith Corp.'s new gas heater. A finned-tube heat exchanger over the combustion chamber and water coils around it give efficiency within 4% of maximum. —BUSINESS WEEK

Lift Truck With Boom—Any 1½-ton object to which a hook, chain, rope, or cable may be attached can be lifted 8 ft. and transported about the factory, warehouse, or docks with the new boom-equipped power truck developed by Elwell-Parker Electric Co. The 60- to 72-in. boom is a horizontal, nonswivel type with its shoulder riding in the columns of the truck. —BUS TRANSPORTATION

On-road-and-off Tire—Closely spaced for smooth rolling on hard-surfaced roads, the tread lugs of a new Goodyear tire are alternately long and short for extra traction in soft ground. —BUSINESS WEEK

Fast Refueler—To save ground time for aircraft, the new 4,300-gal. refueling truck-trailer of Liberty Aircraft Production Corp. has 2 electrical centrifugal pumps, to deliver 290 gpm. —AIR TRANSPORT

Fabric Cement—To obtain solid, permanent adhesion of imitation leather or similar products to plaster, wallboard, wood, or metal surfaces, a pale-colored, slow-drying cement has been developed by Dolphin Paint & Varnish Co. Brush-applied, it does not cause shrinkage. Naphtha will remove surface traces of it. —CONSTRUCTION METHODS



NEW PRINCIPLE OF AERATION—With the new "outward feed" principle introduced by Mine & Smelter Supply Co., pulp to be aerated feeds by gravity through ports in a stationary follower plate and into a revolving impeller. Air enters around the impeller shaft, through a tube supporting the follower plate, and contacts the whirling pulp at the perimeter of the feed-port circle. Greatly increased aeration is claimed. —CHEM. & MET. ENGR.

New-Type Injection Molder—Designed to cut rubber molding costs by eliminating preforms, reducing curing time, and avoiding "flash", the new automatic Tubojector of Hydraulic Press Mfg. Co. utilizes a hydraulically clamped mold. Feed-screw friction raises the rubber to 300° F, an electrical resistance band at the nozzle supplying additional heat to provide rapid curing. —BUSINESS WEEK

Makes Lathes Do More—For bench and engine lathes with swings of 9 to 36 in., a new integral-drive converter of Master Tool & Machine Co. is mounted in the toll-post position on either the compound rest or on the cross slide of the carriage. There are interchangeable heads for external and internal grinding and angular milling, a broach attachment for internal keyways and splines, and a dividing head mounted on the open end of the lathe spindle for gear and spline cutting and grinding. It will do vertical milling and die sinking on a horizontal miller. —COAL AGE

Midget Glow Lamp—About the size of a walnut, the new 1-watt green or white fluorescent glow lamp developed by Westinghouse Electric Corp., fits into an ordinary lamp socket or base plug for negligible-cost safety illumination in hallways, bathrooms, and bedrooms at night. —ELECTRICAL CONTRACTING

Vibratory Grizzly—With conveying capacity of 200 tons per hr., a grizzly manufactured by Syntron Co. has a magnet which vibrates the bars 3,600 times a min., hastening separation at 1½ in. Rheostat control of feed and automatic control of feeder in conjunction with the crusher are possible with this type of equipment. —ENGRG. & MINING JOURNAL

NEW PRODUCTS

Tweezer Welder—Two small metal parts are held together while being spot welded by the tweezer electrodes on the new portable Tweezer-Weld Corp. machine. The tweezers can be held in the hand because the applied voltage is low and the current flow lasts but 1/1,000 sec. —MILL SUPPLIES

Micro Flow Control—An adjustable plunger varies the effective length of the capillary passage from 4 to 600 in. to regulate the flow of gas between 0.2 and 60 cu. in. per min., of light liquid between 0.04 and 10 c.c., in the new-principle Microl valve of Standard Instruments Co. —BUSINESS WEEK

Light Heavy Axle—Unsprung weight is reduced 220 lb. by a light-weight, heavy-duty truck axle with aluminum housing, hubs, and brake shoes developed by Timken-Detroit Axle Co. as standard equipment. Advantages are longer tire life, less truck bounce, more payload. —BUS TRANSPORTATION

Better Brazing Flux—Compounded to melt and form a coating at 480° F. to prevent oxide formation, a new silver brazing flux becomes water-thin at 800° F., allowing it to flow through clearances as small as 0.001 in. and to be eased out of joint by brazing alloy. It is nonhygroscopic, has a pH of 5 to 6, and becomes brittle when cold so that it may be jarred from joint, according to Sherman & Co. —AVIATION

Canned First-Aid Heat—Cigarette-case size, the 22-oz. Redi-Heat block generates "water-bottle" heat in 60 sec. Developed by Mine Safety Appliances Co., it uses a replaceable chemical heating charge that is set off by a spring-loaded lever. —BUSINESS WEEK

Better Direction Finder—Four r-f bands covering all normally desired transmissions, including European and Asiatic, are available in the new 60-lb., 17x11½x9½-in. automatic direction finder developed by Fairchild Camera & Instrument Corp. The iron core loop, transformer, and phasing vibrator are sealed in dry nitrogen. To eliminate a heavy, bulky, 110-volt a.c. inverter and high-voltage receiver power supply, the plates of 14 of the 16 tubes are operated from the 28-volt battery. —AIR TRANSPORT

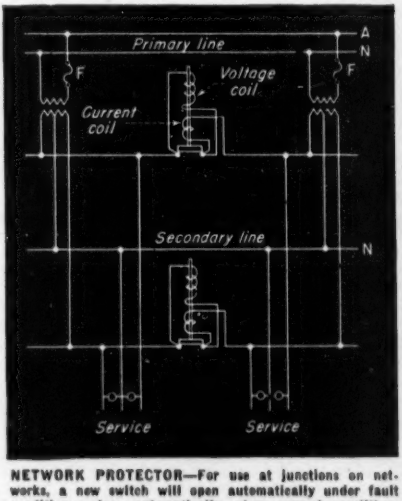
Novel Phonograph Pickup—Operating on the basis of torsional strain in a magnetostrictive wire, the phonograph pickup developed by Magnetostriction Devices, Inc., has a substantially uniform response over a frequency range of 30 to 10,000 cps. Output is about -49 db at high amplitude. —ELECTRONICS

Tiny Battery—Only 5/8 in. high and 1 in. in diam., a 1-amp.-hr. war-developed dry battery has a substantially flat discharge characteristic and requires no rest because of minimized polarization. The steel cell case does not corrode nor take part in the electrolytic action. Zinc and mercuric oxide (rather than carbon) are the active elements of this P. R. Mallory & Co. battery. —ELECTRONICS

Fast Drill-bit—Tipped with carbide, a new drill-bit lasts longer and cuts holes faster in masonry, metals. It is made by New England Carbide Tool Co. —ELECTRICAL CONTRACTING

Tri-core Solder—To speed soldering and avoid flux failure, wire solder with three resin cores has been developed by Alpha Metals, Inc. Thinner core walls cause the flux to flow more rapidly and the solder to melt more quickly. —BUS TRANSPORTATION

Pliofilm Woven into Fabrics—Thread made by twisting thin strips of Pliofilm has been converted experimentally by Goodyear into fabrics of various weights and colors for such products as scuff-resistant traveling bags and shoe uppers. —BUSINESS WEEK



NETWORK PROTECTOR—For use at junctions on networks, a new switch will open automatically under fault conditions, close automatically when normal conditions are restored. Current and voltage coils act in tandem, the former opening the contacts, the latter holding them open until the faulted transformer is refused and the voltage drops to zero. On temporary faults which do not blow the transformer fuse, the switch opens momentarily, then recloses. Advantages are fewer transformer fuses blown, no distant network transformer burned out by overload. Diagram shows the James R. Kearney Corp. switch applied to an overhead, 3-wire, single-phase network. —ELECTRICAL WORLD

Lightweight Power—Weighing but 15 lb. (plus 2 lb. if speed reducer is used) the new explosive-proof 9,000-rpm. electric motor of Electrical Engineering & Mfg. Corp. develops 2 hp. —AIR TRANSPORT

Silicone-Glass Tape—Woven glass fiber is coated with silicone rubber to give high dielectric strength (1,100 volts per mil), water repellency, and resistance to arcing, corona cutting, and 500° F. temperature in a new electrical insulating tape developed by Connecticut Hard Rubber Co. —BUSINESS WEEK

Converts Drill to Saw—Metal, wood, and plastics are sawed or filed by a new reciprocating attachment for ¼-in. electric or air drills or flexible shafts. Developed by Wyzenbeek & Staff, Inc., it has a square plunger with wear-takeup for accuracy and a light weight magnesium body. —MILL SUPPLIES

New Resin Sets Record—Tetrafluoroethylene resin (Teflon) developed during the war by E. I. duPont de Nemours and Co., retains its strength and form at higher temperature (572° F.) than any other known organic material and is useful at —75° F. It resists aqua regia chlorosulphonic acid, acetyl chloride, boron trifluoride, hot sulphuric acid, hot nitric acid, and boiling solutions of sodium hydroxide. —CHEM. & MET. ENGRG.

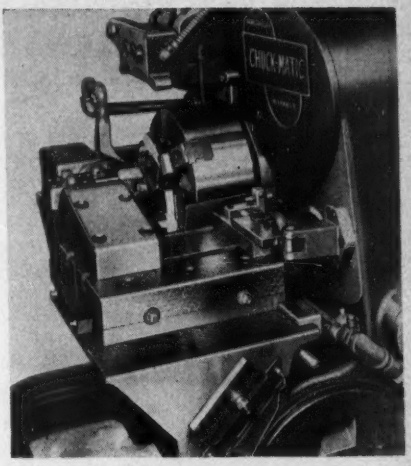
Concrete Brattice Blocks—Concrete tongue-and-groove blocks which do not require cementing and are 90% recoverable have been introduced by Belot Concrete Block Co. for use in place of wood brattice in mines. Individual blocks are 4x8x16 in. —COAL AGE

Little Gyro Indicators—Requiring but 3¼ in. on the plane instrument panel, new electrically driven directional and bank-climb gyroscopes developed by General Electric Co. also save 1 lb. or more of weight. —AVIATION

Push-in Thread Gage—Designed for quick, accurate inspection of internal threads in parts where bench inspection is inconvenient, the Bryant Chucking Grinder Co. portable thread gage has two stationary thread segments and one that is retracted by pressing a lever to permit insertion into the hole. Diameter and out-of-round are conveniently indicated on a dial. —MILL SUPPLIES

Light Turbine Gears—Weighing 1/30th as much as a comparable industrial unit, the new double sun-and-planet airplane gas turbine gear developed by Westinghouse Electric Corp. converts the 12,000 rpm. of the turbine to 1,200 propeller rpm. —BUSINESS WEEK

Dry Fire Extinguisher—Pressurelube, Inc., has developed a new dry-chemical extinguisher which quickly forms a dense, fire-smothering cloud up to a distance of 15 ft. Giving protection from radiant heat, the chemical forms no toxic gases, is a nonconductor of electricity, nonabrasive, harmless to finish surfaces. —CHEM. & MET. ENGRG.



CHUCK-MATIC—This radically different type of single-spindle chucking machine, built by National Acme, will handle production operations on parts up to 12-in. dia. Work is inserted manually in an air-operated chuck. Two heads with carbide tools thereafter perform the machining cycle automatically, so operator can handle as many machines as cycle of job permits. —AMERICAN MACHINIST

Packaged Export Bus—A trolley bus with an all-metal mass-produced body of prefabricated components which nest into a compact package for overseas shipment to take less than ⅛ of normal space has been developed by Great American Industries, Inc. This Westram bus carries 40 seated, 40 standing, is powered by a series-wound 140-hp. motor. —BUS TRANSPORTATION

Protects the Skin—Composed of harmless waxes and oils, and forming an invisible waterproof coating unaffected by most acids or alkalis, "sealskin", manufactured by Cadet Labs., offers protection for the skin against drying cement, concrete, clay, plaster, and other materials. —CONSTRUCTION METHODS

FOR MORE INFORMATION

Inquiries will be welcomed from readers who desire additional facts about any of the items in this issue.

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Jobs for the Handicapped

When properly matched to his job, a disabled person is efficient, stable, and needs little special consideration. Rehabilitation is more than justified economically

The great majority of disabled persons have far more ability than disability. From the standpoint of industrial usefulness, only a small percentage is classifiable as vocationally handicapped. They are handicapped for some jobs, but only a few jobs require all the abilities of a worker. Placed in jobs having requirements they can meet, they are no longer handicapped; their impairments may be turned into assets by the development of compensatory skills or by learning a new, better-paying vocation.

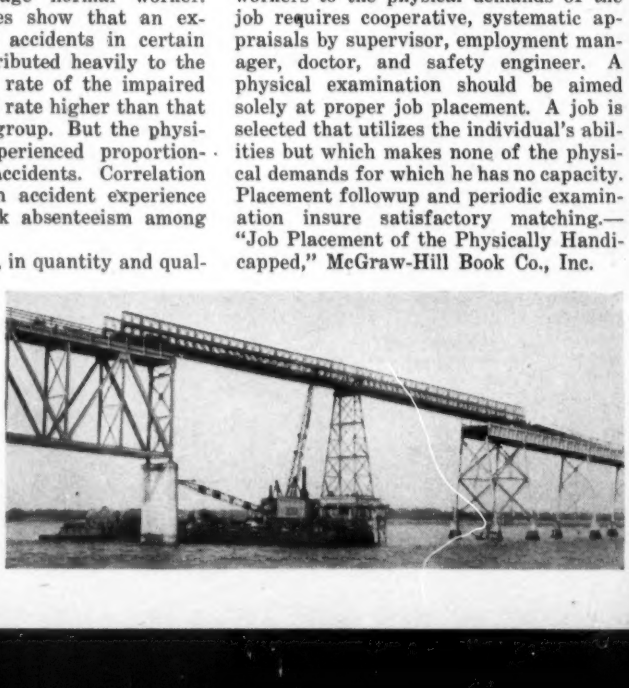
Many a disabled person does not produce as much nor is he as free from accidents as the normal worker; however, investigations show that when he is properly trained and placed, his average performance is considerably better than that of the average normal worker.

Statistical studies show that an excessive number of accidents in certain defect classes contributed heavily to the accident frequency rate of the impaired group, making that rate higher than that of the able-bodied group. But the physically impaired experienced proportionately less severe accidents. Correlation was found between accident experience and short-term sick absenteeism among the impaired.

The productivity, in quantity and quality, and the efficiency ratings of the impaired were found to compare favorably with those of the able-bodied. Little special consideration in transportation, lunch and rest periods, work hours, special equipment, and time-reporting was necessary. Employment stability was superior, and few were forced out due to skill failure or physical-demand failure.

Rehabilitation is individual in character, needs expert guidance, and is economically justified. One study showed that for every dollar spent on rehabilitation, $47 was returned to society. Another study records the average annual wage before rehabilitation as $148, after rehabilitation as $1,768. Tax-supported men became self-sustaining.

Matching the physical capacities of workers to the physical demands of the job requires cooperative, systematic appraisals by supervisor, employment manager, doctor, and safety engineer. A physical examination should be aimed solely at proper job placement. A job is selected that utilizes the individual's abilities but which makes none of the physical demands for which he has no capacity. Placement followup and periodic examination insure satisfactory matching.—"Job Placement of the Physically Handicapped," McGraw-Hill Book Co., Inc.



WAR BRIDGE PLUGS GAP—Bailey trusses, developed to span streams for the Army, quickly closed a 240-ft. gap ripped by a drifting freighter in vital Grace Bridge over Cooper River at Charleston, S. C. Erected in a week and supported by a prefabricated steel tower, the temporary span is high enough to permit permanent repair work to proceed. —BUSINESS WEEK

EXPERIENCE PROVES VALUE OF COMMON NEUTRAL

Experience with the common neutral in the Boston Edison system of electric power transmission shows these advantages:

1. Fewer wires on the top crossarm of the power pole, permitting double spacing of phase wires, an important improvement with several operating advantages that pay dividends continuously.

2. Construction and connections are simplified by solidly connecting the neutral wire straight through as a grounded grid. This eliminates one pole from switches, removes the neutral fused cutout from transformer installations, and does away with 2,400-volt neutral lightning arrester.

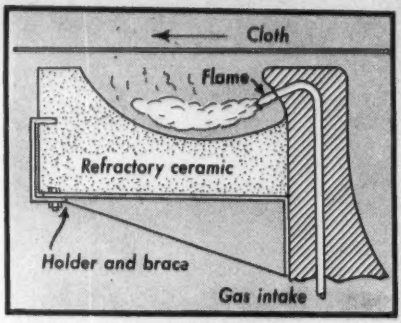
3. In underground construction, the cable sheaths are used to improve the neutral ground grid and as neutral returns.

4. In new underground construction, one cable is eliminated.

Boston Edison, 75% converted to the common neutral after 7 years' work, experiences less trouble from intermittent or "swinging" grounds, finds that phase-to-phase ground faults are more definite, causing more arcing and fusing, but faults are more easily located. Good tree trimming is imperative for increased clearance. Yet, the double spacing made possible by the common neutral reduces exposure to phase-to-phase burning by fallen limbs. —ELECTRICAL WORLD

HANDY LITTLE TOOLS

A syringe for dispensing precise, waste-saving amounts of expensive diamond-lapping compound from presealed color-coded glass tubes has been developed by Engis Equipment Co. . . . Electric hand tools operating on 360 cycles for high speed and ⅓ normal weight have been introduced by Chicago Pneumatic Tool Co. . . . The new variable-speed fractional-hp. grinder of Precise Products Co. revolves at 40,000 rpm . . . Garfield Engrg. Corp. has developed a floating-ball hydraulic work holder with an arm movable to any position. . . . A lightweight portable magnesium-casting power saw which will handle all the wood cutting in house construction has been developed by



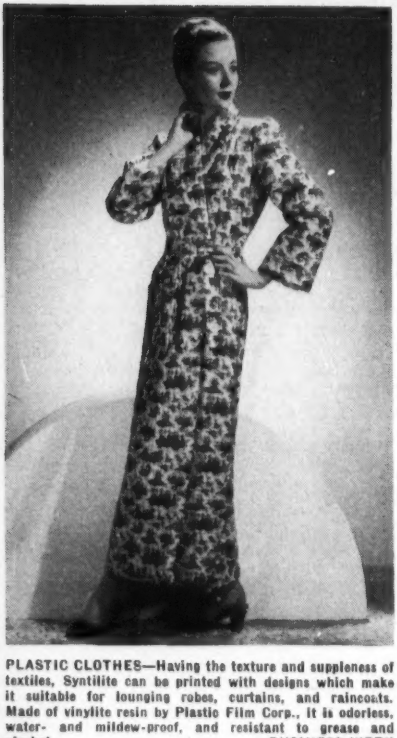
INFRARED DRIES FABRICS—Installed in batteries of 2 to 5, this heating equipment permits the processing of light- or heavy-weight fabrics at normal speed of 50 yd. per min. Easy control of the infrared radiant heat makes the Carbonatic Corp. equipment useful for a wide variety of fabrics. —TEXTILE WORLD

American Saw Mill Machinery Co. A saw for the same purpose has been designed by Skil-Saw, Inc., for attachment of power hand saws of different sizes instead of having a built-in motor of its own. —BUSINESS WEEK

ONE-CARD RECORD SYSTEM

An overall picture of the progress of production on each shop order, and details of the status and the operations of each part and subassembly, are given on a single card at RCA Victor. The system is efficient despite quantity revisions, schedule changes, engineering changes, stock transfer, and approximately 1,000 parts and component assemblies in the average electronic equipment.

Parts received in the stockroom are totalled daily in one column; daily disbursements of those parts to the shops are similarly columned and give a picture of production progress. Colored tabs distinguish types of parts and, moved along the scaled edge of the cards, indicate the total number of units those parts comprise. Intershop loans are noted in the receipts column, in red on the lender's card, black on the borrower's. Record cards are segregated by shop order and filed in numerical order by part number. —FACTORY



PLASTIC CLOTHES—Having the texture and suppleness of textiles, Syntilite can be printed with designs which make it suitable for lounging robes, curtains, and raincoats. Made of vinylite resin by Plastic Film Corp., it is odorless, water- and mildew-proof, and resistant to grease and alcohol. —BUSINESS WEEK

WIDE-FACE FORM TOOLS LAST LONGER

Wear and failure of toolbits apparently are caused by "crowding" of material being cut against the sides of the cutting edge. As a consequence, engineers have been testing wide-face form tools. Such tools seem to last indefinitely, a limitation being the power available to feed the tool, normal percentages of power for drive and feed being inverted.

In a recent application—a carbide-tipped refacing tool for extremely hard, 20x53½-in., chilled cast-iron rolls—the tool face was 6½ in. long, and the tool was plunge-cut fed by a wedge driven in behind it with a hammer. At 15 sfpm., tool life was 10 times that of a chilled-iron tool. —AMERICAN MACHINIST

WATER CONTENT OF POWDER DETERMINED QUICKLY

A rapid, accurate method of determining residual moisture content in most dehydrated foods uses the Karl Fischer reagent. An extremely sensitive electronic device, using resistance changes between platinum electrodes, and an electronic eye, gives titration end-points. The reagent is standardized against a known quantity of water. The known quantity of food powder is diluted with methanol, a measured excess of Fischer reagent is added, the flask stirred magnetically for 3 min., and back-titration carried out with the water-solution. Accuracy is ±0.01% water. —FOOD INDUSTRIES

AIR RATES COME DOWN

An air cargo rate of about 26½¢ per ton-mile, airport to airport, is now charged by American Airlines and United Air Lines, with reductions up to 20% on 3,000 lb. or more, without classification. Pickup or delivery is 35¢ per 100 lb.

These rates are the lowest in the scheduled airline field, but nonscheduled carriers have rates as low as 12 to 13¢ per ton-mile between New York and San Francisco. Larger contract carriers are quoting about 16¢ per ton-mile on long-term contracts and up to 20¢ for one-time shippers.

Pan American Airways carries fresh fruits, vegetables, and milk from Seattle to Fairbanks for 35¢ a lb., to Nome for 45¢. Its commodity rates in the Caribbean are 50 to 70% below air express. Fresh and frozen seafood is airshipped from Havana to Miami for 6¢ a lb.; live plants from San Juan to Miami, 27¢; fresh beef and beef products, eggs, and poultry from the Dominican Republic to San Juan, 6¢. —AIR TRANSPORT

Modifications in Mining

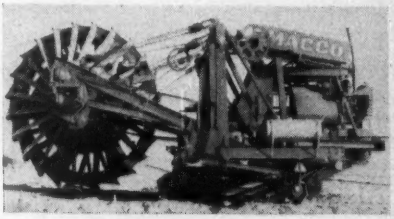
Increased safety and efficiency are being obtained by automatic conveyor-control and by combination of conveyor and scraper

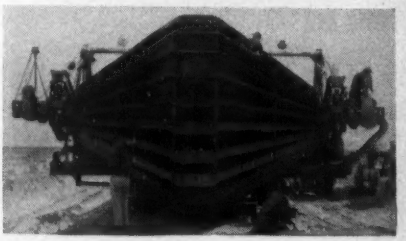
Chain and belt conveyors, "hoe box" scrapers, and tandem gathering conveyors, serving units in chambers, are expanding efficient production in the colliery of Phoenix Coal Co. A 12-in., 4-ply belt sliding along the bottom of a troughed pan line is used in loading-out the caved sections of the rock tunnel by hand. The drive is mounted on a mine car, and four 5-ft. sections of pan-troughing on two 8-in. channels suspended from the tunnel roof are carried behind the car as a tail conveyor. Changes in grade do not affect its operation. Adopting a pin-and-slot fastener in place of bolts speeded the work of extending the line by 5-ft. sections. The entire unit was moved ahead every 200 ft.

Three chain units in tandem work one face and also receive coal from a cross conveyor serving 5 chambers. The third chain discharges onto a tilted platform from which the coal slides into the next unit. This 3-unit mother chain passes under the haulage track and discharges onto another chain that elevates the coal to a loading chute.

Two slope-headings were driven by bottomless, 1-cu.yd. scrapers and chain-and-flight equipment. Ramps facilitate scraper-to-conveyor transfer. A cross-chain conveyor empties onto the main chain conveyor in the hoist-slope. Use of two-tail sheaves permits closer spotting of the scraper and better cleaning of the fall. A flexible eyebolt and wedge allows each sheave to adjust itself to the line of pull. Power circuits and all electrical equipment are kept on the intake air. Compressors nearby supply air at 100 lb. for drilling and driving parts of conveyor units, and for maintaining 30-lb. pressure on the spraying system.

At a drift-operation coal mine in Webster County, West Va., the control system for conveyors had to incorporate remote start, stop, reverse, and sequence starting, with protection throughout. To accomplish operation of a-c and d-c drives from the same control lines, they use a standard 3-conductor a-c pushbutton control with 2 extra conductors added to the central cable. With this 5-conductor cable, start, stop, reverse, and sequence controls are possible, and added features (important in the handling of supplies in low coal) are jog control with dynamic braking, and sequence interlock with magnetic forward and reverse operation. Each pushbutton station is





DIGS AND TRIMS CANALS—This self-propelled excavator of Macco Construction Co., crawling along over a previously compacted embankment, leaves a completely excavated and neatly trimmed canal, ready for Gunite lining, behind it. The cutting edges of the double-conical drum conform to the outlines of the canal prism, and hang from a cable-controlled adjustable frame carried on a crawler-mounted bed. A gas-driven generator supplies current for lights, and for belts that discharge to either side the spoil from the interior of the drum. The cut can be as deep as 5 ft., as wide at top as 15 ft. —CONSTRUCTION METHODS

equipped with a lockout arrangement.

To prevent damage to belts due to slate falls, splice failure or drive slippage, a plugging switch, together with a time relay and a two-coil lockout device, is used. This unit, in conjunction with an intermediate pan, prevents the drag chains running off or out from under the pans of the room and mother conveyors. It also eliminates tearing up the pan line to rethread the conveyor chains. In some sections the materials are delivered in an off shift, when 4 men work as a team, alternately riding the belts (which they control) and loading or unloading. Red and green bulbs at the pushbutton stations aid in locating trouble. An electric eye eliminates the possibility of a man riding through the head end of the main belt conveyor. With this automatic system, there is no need for men at transfer points, saving 16 to 18 manshifts per day. —COAL AGE

ELECTRONIC COOKING

The much-discussed electronic range for cooking has been tested by Hotpoint. It does the job more quickly, but uses several times as much electricity as an ordinary range, and the initial cost is higher ($1,000 for a 1-unit cooker, as against $116). Since it heats the food from the inside out, the electronic unit is excellent for rapid warming of precooked foods, and is satisfactory for, although liable to burn, vegetables. However, meats and breads cooked by the high-frequency waves do not brown, hence appear uncooked and have unusual taste and texture. —ELECTRICAL WEST

NEW TOMATO JUICE PROCESSES

A new dehydrated tomato product, which retains its flavor and appearance and does not cake or deteriorate, has been patented recently. Raw or cooked tomato juice, in the presence of finely divided edible carbohydrate and a stable edible oil, is spray-dried in such a way that there is an instantaneous 100° F. drop in temperature. Another patent covers a continuous process by which tomato juice is salted, its enzymes inactivated, the juice pasteurized or sterilized, deaerated, and delivered while still hot to the filling machines. —FOOD INDUSTRIES

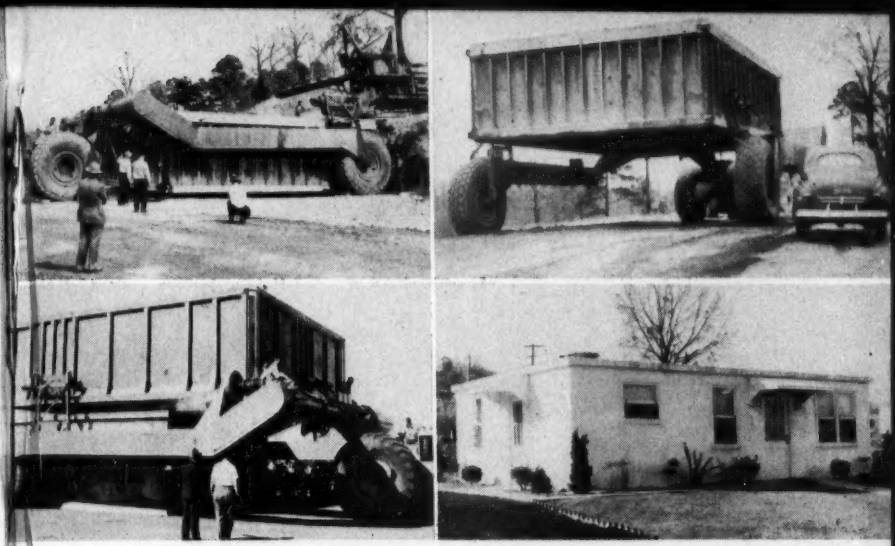
HOW BEAD CATALYSTS ARE MANUFACTURED

Synthetic bead catalysts, consisting of activated alumina contained in silica gel, improved petroleum cracking and increased production of aviation gasoline during the war. Carefully controlled high-purity water solutions of sodium silicate and acid-alum, mixed in exact proportions, emerge as a hydrogel from a nozzle, and, flowing evenly over a fluted cone, fall in 60 streams of droplets through 7 ft. of mineral oil into 3 ft. of water. Complete gelation into 1/3-in.-diameter beads takes place before the droplets reach the water. These raw beads are hot-water treated to set the structure and control density, then aluminum sulphate replaces the zeolitic sodium with aluminum, and washing removes the soluble salts.

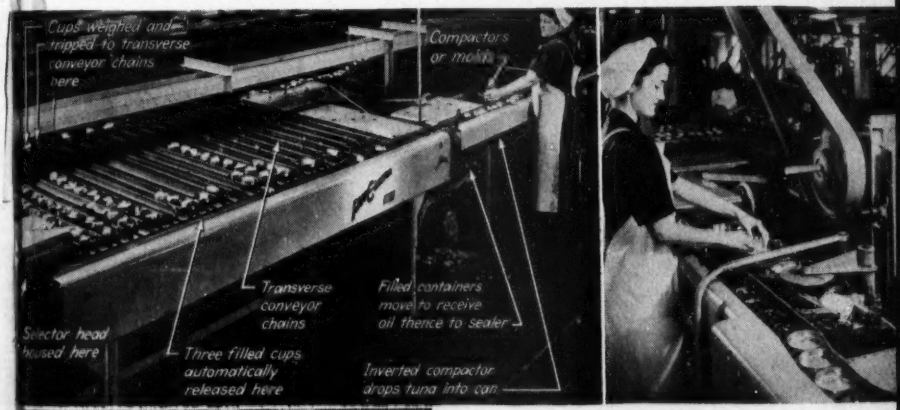
The beads are dried in a 100% steam atmosphere to prevent bursting from rapid drying, and they shrink to 1/11th of their original volume. In the heat-treating and final drying, high temperatures relieve the stresses and impart ruggedness. The beads, with a surface area of 2,000,000 sq. ft. per lb., have sustained catalytic activity, low resistance to vapor flow. —CHEM. & MET. ENGRG.

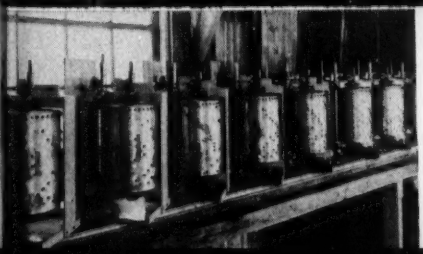
GROUNDS SAVE TROUBLE

Grounding the neutral wire in industrial electrical systems operating on relatively low voltages (2,300 volts or less) is becoming more common in new plants. It avoids the troubles and hazards of ungrounded systems, such as electrical shock, leaks started in underground pipes by heavy fault currents, and cracks in concrete from stray-fault-current heating of reinforcing bars. It minimizes cable and apparatus damage from ground faults. —ELECTRICAL CONTRACTING



HOUSE-LAYING MACHINE—LeTorneau "trailer" produces three 24x30x8-ft., 4-room, 5-in.-wall, concrete houses a week. It lowers heavy outside steel forms over inner forms containing reinforcing mats, door and window frames, electrical conduits, and timber shores. Concrete is poured (above, left) and vibrated. After 24 hr., inner forms are loosened, house taken (above, right) to location and deposited (below, left). —CONSTRUCTION METHODS


Cups weighed and tripped to transverse conveyor chains here
Compactors or molds
Transverse conveyor chains
Filled containers move to receive oil thence to sealer
Selector head housed here
Three filled cups automatically released here
Inverted compactor drops tuna into can



WEIGHT SELECTOR, PACKER—Tuna-fish or other products, mechanically sliced, are carried to this machine (the Pak-C-Lector) in aluminum cups which pass over scales and are automatically tripped, the heaviest first, onto transverse conveyor chains (above, left). A selector head (left) has fingers arranged to select groups of 3 cups which together make up the weight of a can. These groups of cups are conveyed to the operator and to a compactor (above, right) which molds the pieces to can size. A plunger pushes the product into cans. Two can fill 25 cans per min. on this machine of E. H. Carruthers Co. —FOOD INDUSTRIES

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